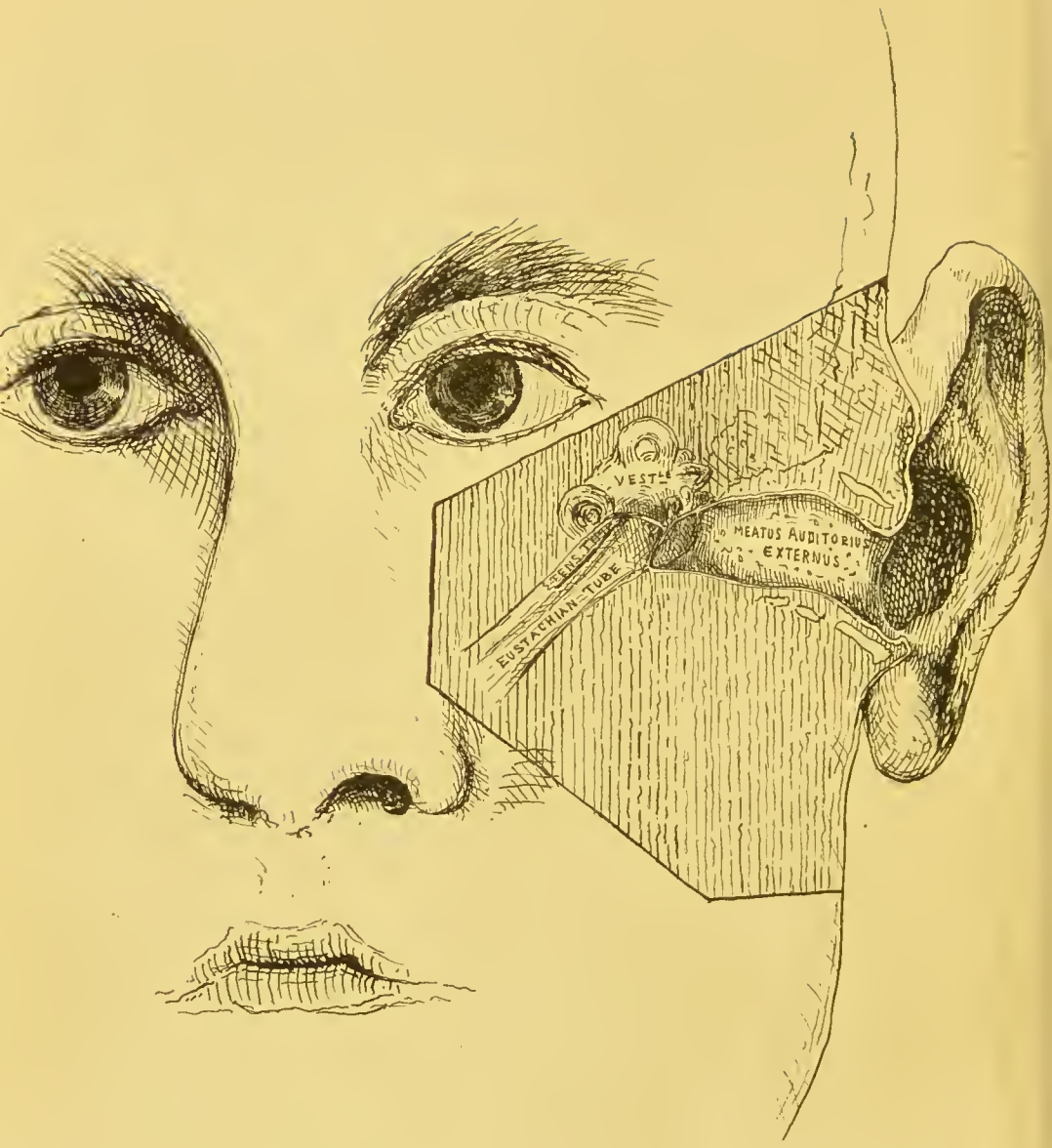
AURAL SURGERY

FIELD



SECTION THROUGH EXTERNAL MEATUS, TYMPANUM, AND EUSTACHIAN TUBE.

AURAL SURGERY:

A TREATISE ON THE CURABLE FORMS OF EAR DISEASE.

BY

GEORGE P. FIELD, M.R.C.S.,

AURAL SURGEON TO ST. MARY'S HOSPITAL, AND LECTURER ON AURAL SURGERY IN THE MEDICAL SCHOOL.

LONDON:
HENRY RENSHAW, STRAND.

1876.

HARRISON AND SONS,
PRINTERS IN ORDINARY TO HER MAJESTY,
ST. MARTIN'S LANE.

TO

H. SPENCER SMITH, Esq., F.R.C.S.,

MEMBER OF THE COURT OF EXAMINERS OF THE ROYAL COLLEGE OF SURGEONS
SENIOR SURGEON TO ST. MARY'S HOSPITAL,
AND LECTURER ON CLINICAL SURGERY IN ST. MARY'S HOSPITAL SCHOOL,

THIS BOOK IS DEDICATED,

IN TOKEN OF GREAT RESPECT AND IN REMEMBRANCE OF MANY ACTS OF KINDNESS RECEIVED,

BY HIS

SINCERE FRIEND AND COLLEAGUE,

THE AUTHOR.

PREFACE.

MUCH of the substance of this work has been already published in the various Medical Journals. I indulge in the hope that it may prove of service to Students of Medicine, and especially to Practitioners who may occasionally require a few useful hints when called upon to treat aural disease. I have endeavoured to place before my readers, not only the results of my own experience, but also, as concisely as possible, the opinions of other aural surgeons, both at home and abroad, who have already done so much for the relief or cure of deafness, and to whom my best thanks are due. Those thanks are especially due to my old teacher, the late Mr. Hinton, whose method and views I so well know and thoroughly appreciate, that his works have naturally been my most cherished as well as fruitful sources of inspiration.

Nor must I forget my indebtedness in that respect to several of my Colleagues who have kindly given me their assistance; to my Clinical Clerk, Mr. Giles, who has made some of the drawings for me; and, also, to Mr. Noble Smith for the care bestowed upon the engravings.

Great pains have been taken with the Index, so as to enhance the value of the treatise generally, by facilitating immediate reference.

31, LOWER SEYMOUR STREET,
PORTMAN SQUARE,
June, 1876.

CONTENTS.

Chapter III.

CHRONIC AURAL CATARRH.

Chapter IV.

CHRONIC AURAL CATARRH—(*continued*).

Chapter V.

OTORRHŒA.

Chapter VI.

PERFORATION OF THE MEMBRANA TYMPANI.

Chapter VII.

ON SOME OF THE MORE SERIOUS CASES RESULTING FROM OTORRHŒA.

Chapter VIII.

TINNITUS AURIUM.

AURAL SURGERY:

A TREATISE ON THE CURABLE FORMS OF EAR DISEASE.

Chapter I.

INTRODUCTION.

Writers in this eountry beginning treatises on diseases of the ear have heretofore almost invariably bewailed, in the first plaee, the imperfect state of our knowledge, and seeondly, the sparse results obtained from the treatment of patients suffering from impaired hearing. I must admit that the first proposition still holds good, especially as regards nervous deafness. But on the other hand, it is very satisfaetory to be able to state that in our more reeent times great advanees have been made, more particularly in the treatment of what may be called curable eases. Many patients suffering from deafness whom we ean now eure or greatly relieve, were a short time ago eonsidered ineurable. How many of the deaf and dumb we are eonstantly meeting might have been saved from their terrible fate if a little timely and rational treatment had been adopted! I say "terrible," for it must be remem-

bcred that, if a child old cnough to talk bccomcs incurably deaf, another evil is added: it gradually loses whatcvcr power of speech it may havc acquircd, and becomcs dumb also.

Celebrated aurists in Germany, in Amcrica, and also in this country—and among the lattcr I may mcntion my eminent predecessors at St. Mary's Hospital, Toynbee and Peter Allen—have done much by their treatmcnt, lecturcs, and writings, to save, I am sure, many a fellow-creature from that miserable condition.

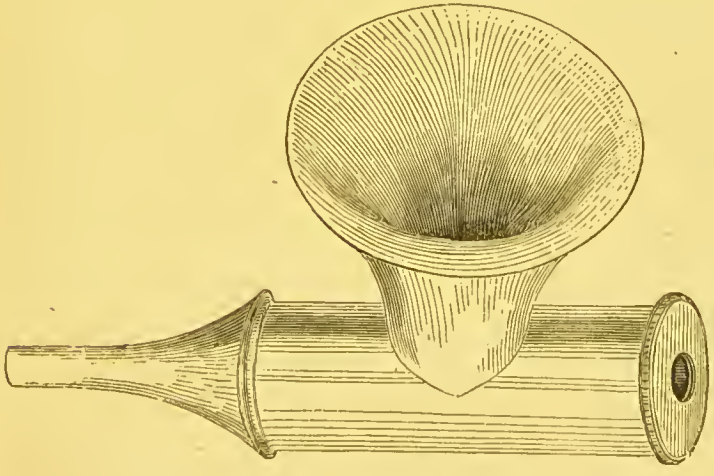
The Governors of St. Mary's were the first to appoint an aural surgeon in any medical school in this country—a worthy example which a great many other schools have followcd, and they have thus been the means of training several most able men who, by thcir researchcs in anatomy and physiology, have brought to light many modes of curing aural disease in cases which a very short time since were allowed, through want of knowledge, either to become chronic, or gradually to sink into hopcless and incurable deafncss.

With these preliminary remarks, I proceed to the first division of my subject.

Examination of the Patient.

How to examine a patient who comes to consult you for deafncss? This may appcar at first sight a vcry simple proccss, but it is not so simplc unless you know how to sct about it. And it is just such slight practical hints about thc bcst way to begin as I shall endcavour to givc that makc a man suc-

cessful in cases where others have failed from not going the right way to work at the commencement, and so failing to examine thoroughly. Absurd as it may appear, I frequently have patients who come to consult me who say "they have wax in the ear, that Dr. So-and-so used a syringe for half an hour, but could not get anything out." Simply, there was nothing to get out; and if a careful examination had been made, it would probably have been found to be a case where some obstruction was inside, such as closure of the Eustachian tubes, and where the Politzer air-bag applied two or three times would complete the cure. Other medical men make an attempt to look in the ear without the aid of a speculum; but as it is common to find the external meatus very curved or narrow, or much growth of hair in the passage, a proper examination is not made. In my opinion the ear speculum is an aid of such importance that I will at once describe



BRUNTON'S OTOSCOPE.

one. Brunton's is by far the best, and its advantages, as given by the inventor, are:—

1. Simplicity of construction.

2. Ease of application, a few trials sufficing to make the observer expert.

3. Precision and minuteness with which the ear can be examined.

4. That it can be used with sun or artificial light —the latter preferred.

5. That it can be used with the magnifying power or not, at pleasure.*

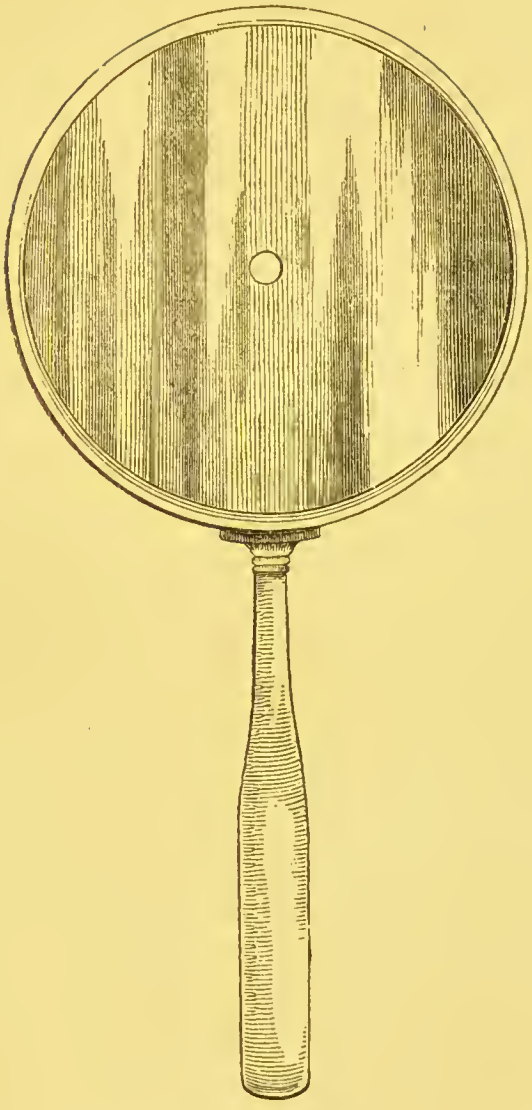
The ordinary silver ear speculum also answers very well when a concave mirror is used.

These, then, are the means we have of looking at the membrana tympani, and it is now most essential that it should be known what the healthy membrane is like. Suffice it here to say that it is a thin delicate membrane of a pearly-grey colour, and presents a bright spot of triangular shape at its lower and anterior portion. Constant practice alone will enable an observer to get familiar with the variations in colour, shape, &c., &c. The next most important point is to find out the exact hearing distance, and the best way of doing this is by bringing a watch gradually

* "Lancet," Dec. 2, 1865.

THE MEMBRANA TYMPANI

(As seen through the Speculum).



HAND MIRROR.

to the ear, and not by withdrawing it *from* it. Then make a note of the hearing distance, so that the next time the patient is seen the surgeon may judge

as to the benefit derived, &c. By the use of the tuning-fork as a means of diagnosis, we are enabled

LEFT MEMBRANA TYMPANI AS SEEN FROM THE INNER AND OUTER SIDE RESPECTIVELY (AFTER QUAIN).

at once to distinguish between the diseases dependent on affections of the nervous and those of the conducting apparatus of the ear—say, of its external and middle divisions, which are the conducting apparatus, from those of the auditory nerve, *i.e.*, the sound-conducting from the sound-perceiving.

If a vibrating tuning-fork be placed on the forehead of a deaf patient he will naturally think that he ought to hear better on the least deaf side, and will often assert that it is more audible on the side whereon which he hears you speaking. Luckily for them, this is not the case with the generality of deaf people, though they think it should be so; but, after trying two or three times, they are generally obliged to admit that they hear the tuning-fork best with the deaf, or deafer ear. I cannot do better than quote Allen on this subject. He says :—

"The common speaking-tube is a familiar example of sounds being strengthened thus, when confined in cavities of any sort. That this is the case with regard to the tympanum and its continuous tube, the osseous meatus, may be proved by closing the external passage with the fingers, when, if a tuning-fork be set vibrating on the head, or a humming

sound or reading be kept up, the sounds, being conveyed through the cranial bones to the cavities of the ear, will become considerably intensified. This fact is made still more evident by placing a vibrating tuning-fork on the forehead, and stopping up one ear with the fingers; the sound will then be more audible on that side. The way, therefore, in which we distinguish affections of the sound-conducting portions of the ear, from those of the nervous, or sound-perceiving apparatus, is as follows:—If the patient be deaf to the sounds of a watch, or a tuning-fork held near (not touching) the external meatus, and yet can hear distinctly their vibrations when conveyed through the solid structures of the head, teeth, and the like, it may be inferred that some obstruction exists to the passage of sound through the meatus, membrana tympani, or tympanic cavity, but that the functions of the acoustic nerve are unimpaired. The surgeon may also assume that the conducting apparatus is in fault if the vibrations of the tuning-fork and the patient's own voice are not better heard when he closes his ears, because it has been shown by the above experiment that the closure of the meatus amplifies all sounds transmitted through the skull or interior of the mouth. It is obvious that catarrhal disease, whether of the tympanum, its contents, or its external membrane, would hinder the escape of the intensified sounds outwards through the meatus, just as effectually as would be done by a plug of wax or the stopping fingers. Consequently you may generally and safely conclude that you have to deal with a case of obstruction of the free entrance of sound

into the internal ear, and not with a nervous affection, if the patient admits that he decidedly hears the vibrating tuning-fork on the deaf or deafer side. Lastly ascertain also whether the patient can hear the vibrations of the tuning-fork on the head for as long a time as you yourself can. The moment he ceases to distinguish the sounds, place the fork on your own head and you may thus determine the difference. Inversely, of course, if the fork be heard very indistinctly, or not at all, when placed on the vertex, we must infer that the auditory nerve is not so sensitive to the impression of sounds as it ought to be, and that either there exists some abnormal pressure upon the labyrinth fluid, or that the nerve itself is implicated in disease."*

The explanation why the tuning-fork is heard better on the deaf side in cases of affections of the sound-conducting portions of the ear is this, as Hinton says :† It is a well-known fact that when any sound reaches the nerves of hearing through the cranial bones, it is heard more intensely if the meatus be closed. If, for example, a tuning-fork be placed on the vertex, and one meatus be closed by the finger, the sound will be heard much more distinctly on that side. It appears to be due simply to the prevention of the escape of the sonorous waves, which are thus thrown back in greater intensity upon the internal part of the organ, and it depends upon the fact that the tympanum in the natural state is easily permeable to sound in both directions

* "Lectures on Aural Catarrh," by Peter Allen, M.D., p. 52.

† "Supplement to Toynbee's Diseases of the Ear," by James Hinton, M.R.C.S., p. 425.

—in faet, sonorous vibrations from within escape through the ear, just as vibrations from without enter by it.

With these remarks on the ear speculum, the watch, and the tuning-fork, without the use of which we are not in a position to arrive at any diagnosis, I proceed to diseases of the external meatus.

Impaction of Wax is a very common cause of deafness; I will give a few hints as to the best way of removing the obstruction. Nothing but the syringe and warm water is necessary; no force should be used; and sometimes, in cases where the wax is very hard, it will be found useful to pour into the ear a warm solution of bicarbonate of soda, 10 grs. to the ʒi, two or three times before we shall be able to remove the whole mass of wax by the syringe. The patient should always stop up his ear with cotton wool after the removal. Use the syringe gently and slowly, as force will often cause giddiness, and might rupture the membrana tympani. We should be careful in giving a favourable prognosis, for, as Von Tröltsch observes, such masses constantly increasing may lead to perforation of the membrane, to gradual dilatation of the osseous meatus, and even to formation of ulcers and deficiencies in it. Moreover, thickening of the surface of the membrane, or even an abnormally deep position of it, with narrowing of the tympanum and abnormal pressure upon the contents of the labyrinth by the stapes, is a frequent result of the same condition. Ear-picks should be especially avoided, for injuries are often caused by sharp metal picks, hair-pins, bodkins, knitting-needles, &c., used for the relief of

itching in the ears, or for the removal of foreign bodies.

"The secretion of the meatus, known as cerumen, or ear-wax, is, according to Petrequin and Kessel, of a smeary consistency, on account of the soapy material made by the potash which it contains. A part of it is soluble in water, another in water and alcohol. It also contains about 10 per cent. of water, a mixture of oil and stearine, and a dry material, not soluble in water, alcohol or ether, in which chalk, and traces of chalk and soda, are found. As age advances, the parts of the cerumen that are soluble in water and soluble substances increase, but those soluble in alcohol diminish, so that in old persons the cerumen becomes dry and brittle. The contents of the ceruminous glands only differ from those of the sweat glands in the fact that the former contain masses of very fine colouring matter. The substance secreted by the ceruminous and sebaceous glands together, is a yellowish-white rather fluid material, which consists essentially of small and large fat globules, corpuscles of colouring matter in masses, and cells in which single globules of fat and colouring matter are embedded; hairs and scales of epidermis are also found in the canal."*

CASES.—1. Mrs. C. came to consult me in October, 1874. Says that she has been deaf for fifteen years, but lately the malady has been much worse. Complains of great noise in both ears. Is unable to hear a watch in contact. It was very evident from what

* "Diseases of the Ear," by Dr. St. John Roosa, p. 160.

cause her deafness proceeded, for both ears were completely obstructed with hardened cerumen.

I immediately removed a very large piece of wax from each ear. Her hearing, of course, marvellously improved. Her satisfaction was great at hearing the rustle of the "Times" as she took it up to read, for, as she said, "she had not heard that sound previously for fifteen years." Both tympanic membranes, although rather opaque, looked remarkably healthy, considering all things.

2. Mr. R., a surgeon, came to consult me for the same cause. He could not hear with either ear a watch in contact, and was suffering a good deal of pain. He had not improved matters by going out hunting in the country in a cold wind. Both ear passages were unusually small, so that I had some little difficulty in getting away the obstruction. After using the syringe gently for some considerable time, large pieces of wax came away, and his hearing returned. He had suffered in this way for some years, the noises had become unbearable, but of course entirely ceased when the cerumen was removed from contact with the membrana tympani. The latter structure was dark in colour, and somewhat thickened in each ear.

3. Miss S., a young lady, aged 18, came to consult me in August, 1875, for her deafness and noises in the ears. She had been very deaf for a year, but much worse lately. She was exceedingly surprised when she saw the large lumps of wax which came away, and was delighted beyond measure at the restoration of her hearing. Both tympanic membranes looked healthy.

4. Mr. D. came to consult me for deafness and tinnitus in his left ear. Could not hear a watch in contact, but heard the tuning-fork better, with the deaf ear. I removed an immense lump of wax; his hearing returned, and the noises ceased. The membrana tympani was healthy.

5. John Hughes, aged 60, came to the Hospital Feb. 27th, 1874. Said he had been deaf for three years, with great noises in his head like a steam-engine, but had never been treated for it. Latterly the deafness and noises had increased so much that he was obliged to come to St. Mary's, to try and get relief. Heard a watch in contact. I removed a very large quantity of wax from both ears. He came to see me again in ten days' time and said he could hear perfectly.

6. A gentleman, of Park Lane, was sent to consult me by Dr. Billing. He had been deaf for three months, but lately his hearing had become rapidly worse, so that he was unable to hear ordinary conversation; the noises in his ears were also very distressing. Both ears were filled completely with cerumen, which came away very easily. A week afterwards he told me he could hear perfectly.

I could recite a great many cases of the same character, but the six I have given are sufficient. The first is somewhat remarkable, for, generally speaking, the hearing is a great deal more affected than it was in this instance, if wax is allowed to remain for so long a period in the external auditory meatus. It is strange how many people are deaf from this cause, namely, neglecting to seek relief,

and how long the more prudent will go on suffering without reeognising their situation.

The secretion of wax in ehildren is sometimes in a fluid state and highly offensive, and, if not speedily treated, often leads to catarrhal inflammation. In adults it is sometimes entirely absent, but the defieiency does not seem in any way to affeet the hearing power.

Toynbee* gives an analysis of such eases. He says:—"Of 165 ears from which cerumen was removed, only 60 were eured, besides 43 eases that were mueh improved. Thus there were 103 eases of great amelioration, while there were 62 ears that were either but slightly or not at all improved. It is therefore important that every ease should be carefully examined after a eolleetion of this kind has been removed; beeause if the hearing power be not wholly restored, some other disease is present which requires attention."

And now a few words as to the best mode of removing foreign substanees introduced into the meatus. Gcnerally speaking, the instruments introduecd for their removal do the most misehief. In almost every instanee instrumental interferenee is unneeessary, and oftentimes dangerous. Careful use of the syringe and warm water will, if perseveringly applied, almost always be sueeessful. If mueh swelling and inflammation of the soft parts should be present (and this is often very severe from irritation and pressure of the foreign body), to relieve it together with the aeute pain, leeehes should be

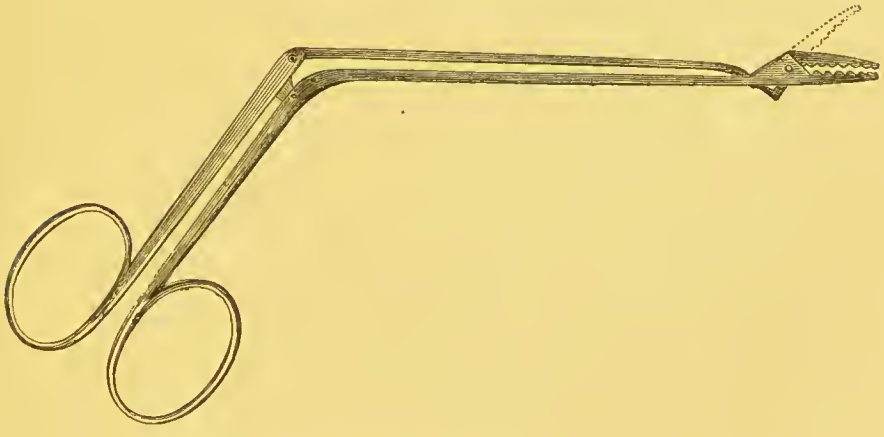
* "Diseases of the Ear," p. 48.

freely applied in front of the tragus; for the meatus and membrana tympani are extremely sensitive when pressed upon by hard substanees. After the inflammation has subsided by this means, and also by the use of fomentations, the syringe will easily remove the foreign body; but we should by no means attempt to do so as long as the slightest tumefaetion is present. Above all, always make a eareful inspeetion of the meatus with the speeulum to see whether there is eertainly something to remove. Often and often have most lamentable results followed attempts to remove with instruments substanees whieh had either never been in the ear at all, or had fallen out of it unnotieed. Inflammation of the brain and death have not unfrequently been eaused in this way, or, if life has been saved, total deafness has followed. Vomiting and eoughing are sometimes met with from irritation of the aurieular branch of the pneumogastrie, aeeording to Toynbee. These symptoms of eourse instantly vanish when the pressure is removed. It is often advisable to turn the patient on his side and syringe from below, or, as Hinton first pointed out, "to plaee him on his baek, if the foreign body, as frequently happens, is jammed into the angle formed by the anterior wall of the meatus and the membrana tympani."

The substanees I have most frequently met with are beads, small stones, peas, eherry stones, slate peneil, pieees of tobaeeo-pipe, shells, paper, eotton-wool, sealing-wax and grass.

Beans, peas, and the like, are very troublesome to remove, as they often swell from moisture and eause intense pain. The other day, at the hospital, I re-

moved an immense lump of tobacco from a labourer's ear, which caused him, as may well be imagined, great pain. The lower orders seem to think this an infallible remedy for every ailment connected with the ear. But, with most substances, it is far better to let them remain in the ear, where, as a rule, they will cause little or no harm, than to use any force in attempting to remove them. These remarks may appear unnecessary; but I can affirm that in nearly every case in which a patient has been brought to me with a foreign body in the ear, mischief has been caused by some anxious friend using a hair-pin, or perhaps even through constant endeavours to get rid of the enemy by the use of a probe or other instrument.



FORCEPS FOR REMOVAL OF FOREIGN BODIES FROM THE EAR.*

The following are two examples of intense suffering caused by endeavouring to remove foreign bodies by instrumental means. They both came under my observation in one week.

* Made by Weiss & Son, 62, Strand.

A. E., a little girl, aged 10, was brought to St. Mary's with a large glass bead in her right ear. She was in very great pain. The walls of the meatus were lacerated and swollen, and the ear was filled with coagulated blood. The mother informed me that she herself had first tried to get out the bead with a hair-pin, and afterwards she had taken her to three doctors, who, as she expressed it, "had all had a try." These repeated efforts had not improved matters. The glass bead could just be seen glistening, deeply seated in the meatus. I at once used a syringe: the mother said that this had been done very frequently already. The bead, however, came away very easily, and I have no doubt that if the nozzle of the instrument had been applied to the roof of the external passage instead of to the floor (which is the common way of using a syringe) the bead would have come away at the first attempt.

The other case was that of a boy aged 8, who was brought to the hospital with a large white pebble in his left ear, and which completely filled up the meatus. The ear was intensely painful and swollen, from efforts that had been made to pull out the pebble. I ordered six leeches in front of the tragus, and the next morning I took away the stone with the greatest ease, by the means adopted in the other instance.

Similar cases are very frequently met with in practice, and I am certain that, if the means I have suggested were more frequently adopted, we should very rarely have to deal with those less fortunate patients who occasionally present themselves at the hospital, with foreign bodies lodged in the tympanum, often-

times resulting in total deafness, or even in a worse fate. Voltolini says truly, "even the point of a dagger, if allowed to remain quietly in the ear, will not do as much harm as forcible attempts to remove it." But at the same time, foreign bodies should not be allowed to remain in the ear too long. The following case is remarkable :—

T. B., aged 6, was brought to me in March, 1874, having suffered for nine months from deafness and from great pain (especially at night) in the right ear. His mother said that he had suffered agony, and every now and then he put his hands to his head and cried out from the severity of the pain. He had been taken to several medical men without any benefit, and was told by some that he had a gathering, and must poultice the ear, whilst others said that he had a polypus; but the last gentleman she took him to discovered a hard substance, and recommended him to be brought to me at St. Mary's. She said that he had been blistered and poulticed regularly for nine months without any benefit. He was unable to hear the watch in contact, and on examination I found a hard substance covered with thick yellow matter. Having carefully syringed, after a little trouble I removed a large smooth oval stone, which had remained in his ear the nine months, had given rise to dangerous symptoms, and had permanently affected his hearing.

M. Pratt, a little girl aged 6, came to the hospital with a black glass bead of the size of a large pea in her left ear. She was sent on to see me by Mr. Lane. Previously, however, to her coming to the hospital, several attempts were made to extract the bead;

but, unfortunately, the mischief was only increased, the bead having been pushed in still deeper, and firmly imbedded, the result of subsequent inflammation. I syringed gently, and postponed any further attempt at removal (as there was a good deal of inflammation) until my next hospital-day. She was, however, laid up with chicken-pox for two months; and when she came to the hospital (February 16th) all inflammatory signs had disappeared; but the bead could easily be distinguished with the speculum, deeply seated and firmly fixed. She was put under chloroform, and an attempt was made to remove it by means of glue attached to the end of a pieee of stick. This failed altogether. She was, therefore, placed on her side, with the affected ear downwards, and the syringe used from below; and, after a little trouble, the bead dropped out. This is a case that one is likely to meet with almost every day. A great deal more harm than good is often done by the use of instruments; but by the following method no injury can be caused. Plaee the patient under chloroform, with the ear affected downwards, and syringe from below. Pull the auriele backwards and upwards (by this means the external auditory meatus is made into a straight tube), and apply the nozzle of the syringe to the upper wall of the passage. The water is then gently foreed behind the obstruetion; the foreign body is loosened, and its own weight will eause it to fall out of the ear. I have removed all kinds of substances in this way.*

In the "British Medical Journal" of the following week, in eonfirmation of what I have just said, Mr.

* "British Medical Journal," March 4, 1876.

Rivington, of London Hospital, made the following remarks:—

"Having had considerable experience in the removal of foreign bodies from the ear, I can strongly support the recommendations of Mr. George P. Field of St. Mary's Hospital, contained in the Journal of March 4th. From the time of my first connection with the Aural Department at the London Hospital I have used no other means of extraction of foreign bodies than the syringe, aided occasionally by chloroform, the dependent position of the organ, and the use of a small pair of curved forceps as soon as the substances appeared near the external end of the meatus; and I have never failed in procuring their ejection. Various kinds of foreign bodies, including peas, beans, pebbles, glass-beads, pins, etc., have been removed in this way, and on several occasions, after previous efforts by the same method or other methods had been unrewarded by success. It is the custom, I know, to make use of special forms of extractors, and instrument-makers vend a rude implement with a bent steel eye, which finds its way into cases of instruments fitted up for the receiving-rooms at hospitals. From the incautious use of such a weapon I have seen irreparable damage done to the membrana tympani, combined with displacement of the malleus and incus, and I cannot but think that it should be be banished from the surgical armamentarium.

"In one or two cases the injury has been effected when no foreign body has been present in the ear. A child is brought, we will say, by one of its friends, with the statement that there is a foreign body in the ear, and a request for its removal. The foreign

body, perhaps, has fallen out, or was never in the ear at all. Without an examination of the ear, either by direct light or with the speculum and mirror—a proceeding which should never be omitted—a probe is introduced into the meatus, and, reaching the membrana tympani, impinges upon the malleus, which is thus mistaken for a foreign body. The 'spud' is called into requisition, clicks in its turn against the malleus, and, being used with a view to being placed behind the obstruction, very speedily causes laceration of the membrane and displacement of the bone. The malleus being dragged forward into the meatus more certainly yields the indications of a foreign body, and renewed efforts are made for its removal, with the effect of increasing the mischief, hæmorrhage, and pain. Much the same results have followed the impaction of a small stone or bead where the spud has been employed, the foreign body being driven inwards against the membrane and causing its rupture. In one case, which came under my notice, the promontory was mistaken for a foreign body. It is a great error to suppose that it is necessary to extract a foreign body from the ear immediately, or at the first visit of the patient. When prolonged efforts have been made unsuccessfully, it may be much better to wait for a few days until the tenderness, disturbance, and disposition of the parts involved to bleed and thus obscure the view of the impacted substance, real or supposed, have passed away. The practitioner may disregard the anxiety and urgency of the friends for further interference, and explain the advantage of delay. At the next visit of the patient he will be rewarded by the com-

parative ease with whieh the syringe brings away the offending substanee.

"Although I have seen a loop of wire employed for the removal of foreign bodies with great dexterity and success, I feel convineed that for general use it is not to be eompared in point of safety to the syringe. In imperfectly edueated hands it would be liable to perforate the membrane.

"To sum up, the proeedure in eases of foreign body in the ear should be as follows:—

"1. Examine the ear earefully by direet light and with a speculum and mirror, to determine the presenee, position, size, nature, and peeuliarities of the substanee.

"2. If the patient be a child and refraetory or timid, plaee him on a eoueh, give ether or ehloroform, and use the syringe, turning the affeeted ear downwards. This manœuvre may be aided, as Mr. Field suggests, by drawing the auriele upwards and baekwards, and applying the nozzle of the syringe to the upper wall of the passage.

"3. If the foreign substanee do not fall out, as it usually does, after a little patienee, but stops near the orifiee of the meatus, a fine pair of foreeps may be used to withdraw it.

"4. A needle or a pin, or other elongated body which does not fill the passage, may be readily taken out with the foreeps through the speeulum, or by the aid of a direct light.

"I must not conelude these few remarks without expressing my obligation to the late lamented Mr. Hinton for the kind assistanee which he rendered to me some years ago, when desirous of acquiring some

little knowledge of the method of examining aural patients. I remember speaking to him about the extraction of foreign bodies, and asking him what method he recommended for their removal. He replied that 'You will not use any other method than the syringe if you are wise.' With the slight exception specified above, I have never done so; and I feel sure that those who adopt the sound advice tendered by Mr. Hinton and Mr. Field will never have occasion for disappointment or regret."

Boils are frequently found in the external meatus. They generally occur in people of middle age. They are, as a rule, extremely painful. The following is a case in point:—

A lady from Hyde Park Gardens, aged 56, came to me for relief from intense pain in the right ear; she could not bear it touched. I ordered linseed poultices, which considerably relieved her, also a quinine and iron tonic. In two days' time I opened the abscess freely; in a week she was quite well.

Some authors recommend pouring into the ear a strong solution of sulphate of zinc to induce resolution, or the application of nitrate of silver. I prefer the other treatment. The only kind of aural disease in which poultices ought to be used is, in my opinion, when the surgeon finds such intense suffering as arises from a boil in the external meatus. Here they are of great service: in all other varieties of inflammation they only lead to increased suppuration and probably perforation of the membrana tympani. I have seen blisters occasionally ordered behind the ear: these merely increase the irritation and are only of service in few cases of chronic discharge

from the ear. In all acute forms of aural disease they should be avoided.

INSECTS often enter the meatus. Warm water is all that is necessary to stop the irritation, and the syringe is all that is required for their removal. It is very common to meet with patients who imagine they have insects in their ears. A woman attended me at the hospital who insisted that she had a black beetle in her ear, and was deeply offended with me when she was told that nothing of the kind was visible. Simple folk from the country I have found have a predisposition te recognize the presence of earwigs.

A vegetable FUNGUS is sometimes met with in the auditory passage.

"The *aspergillus*," according to Roosa, "is the one most commonly found. The symptoms are similar to those from inspissated cerumen. There is a sensation of fulness in the ear, with tinnitus, impairment of hearing, and pain. Pain, however, is not a common evidence of inspissated cerumen, but it is, on the contrary, one of the symptoms of otitis parasitica. It is a dull, heavy sensation in the ear; not a primary disease, but a consequence of diffuse otitis, which may have been of very mild form. It is very often found after eczema. Some kind of inflammation, which loosens the epidermis, has first occurred. The fungus is actually such a 'mould,'—as clings to damp walls and adheres to bread not kept thoroughly dry. As we might expect, the habit of the Russians to live—as they are almost compelled to do—in badly ventilated rooms during their long winter, is very favourable to the production of aspergillus.

"These vegetable fungoid growths in the ear were formerly mistaken for impacted cerumen and otitis externa. Their whitish or blackish flakes, adhering to the walls of the canal or to the membrana tympani, may easily be mistaken for epidermis or hard wax. When the casts are removed the tissue beneath is found to be reddened and tender, and in a few hours the growth will be found to be reproduced. The microscope must be called in to make the diagnosis certain."*

ENLARGEMENT OF THE OSSEOUS WALLS is not unfrequently met with, especially in women, causing a narrowing of the ear passage and consequent difficulty of hearing. Small ivory bougies, three-quarters of an inch long, are often very beneficially employed.

EXOSTOSIS often forms and in the same way impairs the hearing. Tincture of iodine freely applied is the best treatment. Wilde recommends "counter-irritation, depletion, and mercurials to arrest its progress in the early stage when there probably exists a chronic state of periostitis."†

SEBACEOUS TUMOURS sometimes block up the passage. These must be treated in the ordinary way, taking care to remove the capsule of the tumour as well as its contents.

SKIN DISEASES very often attack the ear. Of these eczema is perhaps the most common, and it is very often met with in children. The following is a typical case:—Esther Gower, aged 13 months, was brought to me at the hospital March 3rd, 1874. Six

* "Diseases of the Ear," Roosa, p. 135.

† Holmes' "System of Surgery," vol. 3, p. 150.

months previously she had lost her mother, and had been constantly ailing since. The right ear and side of the head was one mass of eczema. Ordered a bread poultice and a weak carbolic acid lotion and ʒj of steel wine and of cod-liver oil three times a day, and a grey powder occasionally. March 10th. Was much better. The ear looked much more healthy and cleaner. I ordered calamine ointment instead of poultices, and to go on with other treatment. She came to the hospital regularly, and on April 7th was discharged cured. I have found the *unguentum rubrum* of the hospital pharmacopœia very useful in chronic cases.*

Eczema is very common in women about the change of life: it causes a most distressing itching sensation in the ear, and there is generally great redness and swelling present. Constitutional treatment is very necessary, and small doses of arsenic I have found generally beneficial. A weak lotion of acetate of lead relieves the itching.

Erysipelas is frequently met with. The following is a case:—E. S., aged 54, came to the hospital November 10th with erysipelas over the whole of the right ear and side of the head. The meatus was nearly closed and she was suffering from burning sensation of the skin together with great redness and swelling. She was ordered a brisk purgative, large doses of perchloride of iron, and a warm carbolic acid lotion to be very frequently syringed into

* ℞ Hydrargyri Bisulphureti (not officinal).
Hydrargyri Oxidi Rubri, āā gr. 6
Creasoti ..... ♏ij.
Adipis ..... ʒj
Misce.

the ear. As she could not sleep at night she was also ordered morphia. Under this treatment she got rapidly better. The ear should not be exposed to air, but kept lightly covered over. In this way stareh powder dusted over the affected part with a camel's hair peneil is often very useful; at the same time the head must be kept eool. Erysipelas may be acute or chronie, more frequently the latter.

Other skin affeetions are oeeasionally met with, sueh as impetigo, herpes, pemphigus. Syphilitie diseases, too, are not uneommon. These must be treated in the ordinary way; the following eases are interesting:—

M. MeM., aged 25, eame to the hospital Mareh 31st, 1874. She had syphilitie disease of both tympanie membranes, together with offensive diseharge from the ears and eruption of the skin. Some time previously had had a hard sore. Said that she "had been quite deaf for one month, and that her life was a misery to her." I ordered gr. viii of the iodide of potassium, with einehona, three times a day, a nitrie aeid gargle, as her throat was in an unhealthy state, and a earbolie aeid lotion for the ears. The Politzer air-bag was also regularly used, and in six weeks' time she lost all signs of the disease and heard perfeetly well.

The next ease I shall mention is of one of mueh greater severity.

F. G., aged 50, eame to the hospital July 28th. Five years previously had syphilis badly. Had been deaf ever sinee, and was getting rapidly worse. The membranes were very white in eolour and thiekened. Heard a wateh in eontaet with left ear; but not at all

on the right side. Some difficulty was experienced in using the Politzer bag, as the nasal bones had quite gone from syphilitic disease. Large doses of iodide of potassium were given. On August 4th, her hearing had improved considerably (for she heard the watch three inches off on the left side, and in contact on the right); she went on slowly hearing better, as her general health improved. Her throat was very troublesome for some considerable time, but she never had any discharge from, or pain in, her ears. The doses of iodide were gradually increased, and the Politzer air-bag was regularly used twice a week.

CONDYLOMATA around the orifice of the meatus are frequently found.

HEREDITARY SYPHILIS is a very common cause of deafness. The patients (mostly females) almost invariably suffer from sight that has been defective previously to the impairment of hearing. Mr. Hinton, at Guy's Hospital, found that these cases furnished more than one-twentieth of the aural patients there. He thus described the appearance of the membrana tympani, &c. "On examination it is found that a tuning-fork placed on the head is heard for a very short time, or not at all; the meatus is free from wax; the membrana tympani looks somewhat white and rough; it may be flat or too concave, but it generally has a dried-up look, as if its juices were deficient. The throat is by no means always unhealthy. The peculiarly harsh sound produced by passing air into the tympanum suggest the presence there of rough lymph, or the almost total deafness proves that the labyrinth has suffered." He re-

commended seruple doses of hydrochlorate of ammonia.*

The symptoms, treatment, &e., of acute and chronie inflammation of the meatus will claim notice when I come to various forms of aural catarrh.

INJURIES to the AURICLE are, as a rule, easily treated, and generally, as in the following case, do well.

J. G., a little boy aged 8 years, was brought to the hospital in the Manvers Ward, with the right ear almost torn off from a fall on some gravel. I earefully sewed it up with 16 sutures, and in a month's time he left the hospital with hardly any trace of the injury.

* Supplement to Toynbee's "Diseases of the Ear," p. 461.

Chapter II.

AURAL CATARRH.

This disease has been divided by authors into various forms of aeute and ehronie inflammation of the mucous membrane of the ear passages.

Toynbee ineludes the external meatus, and in his book mentions simple chronie inflammation of the dermoid meatus, chronie eatarrhal inflammation of the dermoid meatus, and eatarrhal inflammation of the dermoid layer of the external meatus, with earies of the posterior wall, &c., &c., &c.

Von Tröltsch and others, however, objeet to catarrhal inflammation being aseribed to disease of the external meatus, for he says there eannot be eatarrh where there is no mueous membrane. The German author makes the following division:—1. Simple acute eatarrh; 2. Simple chronic catarrh, divided into dry and moist, &e.; but (as Mr. Hinton justly observes in a note in his translation of Von Tröltseh),* "in attempting to better demonstrate the extreme variety in which the chronie eatarrhal proeess shows itself in the middle ear by representing eertain prominent manifestations of disease in apparently separate groups, I have not meant to establish different forms of disease, and I would lay speeial stress upon the faet that the three forms alluded to

* "The Surgical Diseases of the Ear," by Professor von Tröltsch, translated by James Hinton, pp. 48 and 53.

oeeur mueh less frequently alone than combined in various ways, and the one passing into the other." In Holmes' "System of Surgery"* Hinton himself gives us aeute and ehronic inflammation of the mueous membrane of the tympanum. And lastly, my predeeessor, the late Dr. Peter Allen, in his work on Aural Catarrh, says:—†

"Aural eatarrh must not therefore be eonsidered as an affeetion in whieh the mueous membrane of of the cavity of the tympanum and Eustaehian tube is solely involved, but it is applied also to eatarrhal inflammation of those struetures which are lined with a continuation of the mueous membrane of the tympanum, as well as to eertain forms of diffuse inflammation of the dermoid layer of the meatus. Some writers restriet the term eatarrhal inflammation to mueous membrane only. There are, however, high authorities who do include under it inflammatory conditions of the external walls of the meatus. I find it convenient to designate this very frequent disorder in ehildhood as eatarrhal, beeause we eannot distinguish whether the inflammation from eatching cold may not have begun in the tympanie structures on the inner side of the drum head, and then passed onwards and outwards, by continuity of surfaee, to the meatus. We may, therefore, I think, quite as eorreetly name this eondition catarrhal or dermoid. If the inflammation from within or without stopped at the margin of the membrana tympani, we ought to define the affection as belonging either to one or the other strue-

* Vol. 3, p. 166.

† On Aural Catarrh, p. 24.

ture; but, as we cannot be so acute in our diagnosis as to be able to detect the moment when it ceases to advance, either on the inside or the outside, any sharply restricted definitions are in practice useless."

From these different opinions it will be seen how difficult it is to define clearly any one form of aural catarrh, for in practice they are constantly found mixed in various ways one with another. We should not jump at conclusions and say, for instance, "this is a case of chronic catarrhal inflammation of the dermoid meatus, and must therefore be treated in such and such a way." In fact, we must not treat the disease, but simply the symptoms that each individual case presents to us.

I purpose to bring forward in illustration of what I have just said a number of cases with the treatment I have found useful.

I will begin with a malady which most of us have experienced—viz., earache, and acute catarrh of the middle ear (this, of course, varies very much in intensity). In young children it is frequently met with: the child at first gets restless, refuses food, cries out, and is evidently suffering intense pain; castor-oil or grey powder is generally administered, the gums are carefully lanced, or may be the stomach is well poulticed, without, it is needless to say, any good effect. In a few days, however, a discharge is noticed from the ear, and the child in the majority of cases gets well, but occasionally the symptoms increase, the little patient either becomes more or less deaf or dies from *so called* "teething!" I have seen a great many cases of this kind; in fact, one of

my own children suffering in this way first drew my attention to the subject. It is nearly always brought on from cold, is generally confined to one ear, and this fact is an important one; the child refuses invariably to rest its head on the affected side, a circumstance which ought to draw attention at once to the seat of the malady.

The treatment I recommend is the constant pouring (not syringing) of warm water into the external meatus. This, as a rule, gives immediate relief, as the child will go to sleep. Perhaps a leech in front of the tragus will be found necessary in some cases. Purgatives at the same time should be administered.

In all these forms of acute catarrh the tympanic membrane (as one would expect from increased vascularity) will be found to be either pink, red, or copper-coloured, according to the stage or severity of the attack. Children when they grow a little older suffer from earache arising from chronic inflammation of the external meatus. This I shall notice on another occasion.

I will now cite a case of somewhat similar character occurring in an adult, viz., acute catarrh of the middle ear and Eustachian tubes after sore-throat.

J. M., Esq., æt. 25, sent to consult me by Mr. Owen (Aug. 10th, 1874). Had been slightly deaf for three weeks from cold, but two days before had got a sore-throat, after which his ears began to ache. He was suffering intense agony over both sides of his head, aggravated very much when he swallowed, so much so that he was afraid to eat. The whole of the naso-pharyngeal mucous membrane was very much

congested. Had great tenderness over the mastoid process on both sides; could not hear my watch with the left ear, but heard in contact with the right. His face was flushed; he had a quick pulse and hot skin. Both tympanic membranes look bright red in colour, and the right external auditory meatus was very tender to the touch; there was no sign at present of bulging of either membrane; the Eustachian tubes were impervious. Tinnitus aurium was present in both ears, very severe and distressing in the right; six leeches were ordered in front of the tragus of each ear; a saline mixture with morphia, and a brisk purge also given. The next day great improvement was felt in every way, the pain had almost gone, but the tinnitus was still present. The Politzer bag was used, and air passed easily through the Eustachian tubes. A feeling of great relief was immediately experienced, and the tinnitus aurium almost stopped. The tympanic membranes had lost some of their redness, and looked more healthy. The throat was painted with a solution of nitrate of silver, 10 grs. to the ounce.

Six more leeches were applied in front of the right ear, as there was still tenderness felt in the external meatus and on the side of the face. This gave immediate relief. The Politzer bag was used daily with very good effect; a considerable quantity of fluid was heard bubbling as the air passed into the tympanum on both sides. The paint to the throat was continued, and iodine liniment applied daily behind the ears. This treatment was continued daily for a fortnight, the mucous membrane of the throat, &c., became less and less congested,

the fluid gradually disappeared from his ears, and he rapidly regained his health and hearing.

Von Tröltsch* recommends that when applying leeches the ear should be carefully stopped up with cotton-wool, and the bites should afterwards be covered with plaster, as erysipelas might otherwise occur, from the wounds being poisoned by the otorrhœa.

I am certain the greatest amount of good is gained by leeching *freely:* two or three leeches are of no use whatever in a case of this kind. If bulging of the membrane is present, paracentesis should be resorted to at once, to let out the fluid. This is especially necessary in acute catarrhal inflammation following scarlet fever, measles, &c., for not only the cavity of the tympanum, but the mastoid cells also, are often filled with puriform fluid. In this operation the head should be well supported, a good light should be thrown on the membrane through a silver ear speculum, and the puncture should be carefully made in the posterior and inferior portion of the membrana tympani, for here we shall nearly always find the greatest amount of bulging.†

Sometimes the matter makes its way through the membrane, and, if attended to early, no bad results take place, as the perforation, when treated with a little care, will generally heal, or, if an aperture remains, it does not necessarily cause deafness, for we see cases where, even with a large hole in the

* "Surgical Diseases of the Ear," p. 23.

† For further information on this subject I would refer the reader to a very able paper by Dr. Cassells, of Glasgow, published in the Edinburgh Medical Journal for March, 1876, and kindly sent to me by the author.

drum head, the hearing power is acute. Only the other day, a child was brought to me from the country who had lost nearly the whole of his right tympanic membrane after scarlet fever, and his hearing was perfect. Frequently, however, a very different effect follows, simply, as a rule, from neglecting rational and timely treatment. Over and over again children are brought with otorrhœa following one of the zymotic diseases, and the parents invariably say they have been told that "the child will grow out of it." You would imagine that for cleanliness' sake they would endeavour to get rid of this foul discharge, instead of allowing it to feed for months or years on the delicate structures of the ear. In some of these patients very serious results to health and hearing, as one can easily believe, occur. I shall, therefore, first give cases where from early treatment little or no mischief has taken place, and I shall then bring forward some instances of a more serious character arising from neglect.

The first case is that of D. S., æt. 40, who came to me at the Hospital with severe pain in the right ear. Says that last week "he got wet through in the rain," and since that time the pain in his ear has been increasing. About three days ago he was in "excruciating agony." He then poulticed his ear every hour with hot linseed poultices for two days until something burst, and some thick matter came away. He was very much relieved after this, but still suffered a good deal of pain, and the discharge from his ear was very thick, extremely offensive, and continually running. Was unable to hear watch in contact. Had a very large perforation in the mem-

brana tympani, through which the abscess burst. As there was still a good deal of tenderness, I ordered six leeches, and the ear to be gently syringed every other hour with warm water, and stopped the poultices. Next day he was much better. I then prescribed a weak solution of carbolic acid—gr. i to the ounce—to be poured warm into the ear four times a day after the syringe had been used with warm water. He soon got much better and the discharge lost its offensive character. The lotion was then changed to gr. i of acetate of lead to the ounce. He was directed also to draw up through his nose a warm solution of bicarbonate of soda (a teaspoonful to the pint of water). By this means the fluid passes up the Eustachian tube through the perforation, carrying with it the discharge into the external meatus, and thus thoroughly cleansing the ear from the inside. He was told also "to hold his nose and blow" when he poured into his ear the lead lotion. Bubbles of air thus pass in through the perforation in the membrane, and drops of fluid replace them. By this means he attacked the malady from without, as he had also by the other method, from within. Under this treatment the perforation got rapidly smaller, his hearing improved, the discharge gradually ceased, and at length, in three weeks' time, the aperture closed, and his hearing returned as perfect as ever.

This man had excellent health, which was, of course, greatly in his favour. At the same time I am sure that if the parts are kept constantly clean in these recent cases of rupture, the membrane will generally heal in as satisfactory a manner as with this

patient. It is of no use to use a syringe three times a day to get rid of the thick pus; it ought to be constantly washed away, so that the weak astringent lotions one is obliged to use in such cases can make their mark upon the diseased tissues.* If the drum head, when in a healthy state, be punctured, that puncture will rapidly close up again—it is the most difficult thing in the world to keep it open. So, in the same way, if the membrane is ruptured from an abscess bursting through it, the surgeon's great aim should be to get it in a healthy state, and if that condition be gained, it will heal up almost as rapidly as when an incision is made. This is more readily accounted for when we remember that, in almost all cases of perforation from acute catarrh, a longitudinal slit, and not a round hole, is first made in the membrana tympani. But, if the discharge is allowed to continue for some time, a round orifice is formed from constant passage of the fluid, and hence we have far greater difficulty in effecting its closure.

The symptoms of these cases of acute aural catarrh vary slightly one from another, as I have already pointed out; but the above case is one very commonly met with. Occasionally we find that one astringent proves of much greater service than another; it will therefore be found beneficial to change the lotion from acetate of lead to sulphate of zinc, and so on.

Politzer says on this subject: "In cases of acute purulent catarrh of the membrana tympani, weak

* Sir William Wilde truly says: "So long as otorrhœa is present, we never can tell how, when, or where it may end, or what it may lead to."

solutions of the preparations of zinc and lead are very efficaeious. The preparations of lead frequently act quicker after a zinc solution has been used for a few previous days. Perchloride of iron, alumina, and nitrate of silver are not generally adapted to acute cases. In eases of purulent catarrh with a small perforation of the membrana tympani, a solution of lead dropped in is very useful. An extremely favourable result has been brought about by the use of powdered alum. Most of these preparations lose their favourable aetion after being applied for too long a time without being suspended."

As instanees of the more serious class I may mention the three following cases :—

E. D., æt. 19, came to the hospital from Walton to eonsult me last January. Had been deaf for ten years after typhus fever. Could not hear watch in eontaet with either ear, and eould not hear my voice. Her mother was the only person who ean make her understand anything. Could hear tuning-fork on vertex. The membrana tympani in both ears was eoneave, thickened, and of a dirty grey colour. Eustachian tubes eompletely closed. For the last eighteen months had been gradually losing her speeeh, and was almost dumb. After a little diffieulty I passed the Eustachian eatheter, and continued to do so regularly once a week, and afterwards once a fortnight, and at the same time gave her large doses of iodide of potassium. Under this treatment she improved considerably, her speech eame back by degrees, and six months after I first saw her she eould talk perfectly well, and although she was still what most people would call as "deaf

as a post," anyone, by a little extra exertion, could make her hear. She could understand perfectly what I said to her. I could see very little difference in the colour and shape, &c., of the tympanic membranes. Of course there was great difficulty to contend with in this case. The sound-perceiving and sound-conducting apparatus were both at fault; but by improving the condition of the latter the auditory nerve was enabled to appreciate and use what little power it had been left with, and by this means she was prevented from being dumb as well as deaf.

I had another case of very similar character. W. D., a boy, æt. 14; deafness six years after scarlet fever; came to see me at the hospital; he lost his speech and hearing—and very considerably improved by much the same kind of treatment, the Politzer bag being used instead of the catheter.

W. H., æt. 8, was sent up from Esher March 2nd, to consult me. Had been deaf five years, had had during the whole of that time a constant offensive discharge from both ears, and both membranes were perforated. For the last six months or so, had been gradually losing his power of speech, so that when he was admitted into the hospital under my care, he was almost deaf and dumb; he could not hear watch in contact with either ear; he had never been treated in any way for his deafness; in fact it was simply a case of neglect. With the aid of various and often changed astringent applications, the mucous surfaces regained a healthy condition and the discharge ceased. By constant care for two months he was able to talk and also to hear very well on leaving the hospital.

Again, we may have acute non-suppurative catarrh, or, as Von Tröltsch calls it, simple acute catarrh of the ear. He says:* "It is characterised by the rapid appearance of hyperæmia and swelling of the entire mucous tract of the middle ear, with considerable increase of secretion, which, however, still preserves its mucous character. This state is generally associated with other catarrhal diseases, influenza, pharyngeal or bronchial catarrh, or even pneumonia. Syphilitic disease of the throat is a not uncommon starting point for it. The prognosis is so far favourable, as perforation of the membrane only occurs rarely, and then nearly always during violent sneezing or blowing the nose. The hearing of the patient can be very considerably improved by early local treatment; but, by such an acute attack, the foundation is not unfrequently laid for insidious aural catarrh, since thickening of the mucous membrane of the Eustachian tube and tympanum, abnormal bands of adhesion, &c., are very apt to remain after it. The main point is to prevent the development of such conditions by removing as soon as possible the mucus accumulated in the ear." He recommends early incision of the membrane, and "in milder cases air douches (catheterism or Politzer's process) undertaken as soon as possible are sufficient, since in this way a mode of escape is provided for the mucus present, and the adhering surfaces of mucous membrane in the Eustachian tube and the tympanum are separated from one another."

* "Diseases of the Ear," by Dr. von Tröltsch, translated by James Hinton, M.R.C.S., p. 48.

I shall fully discuss paracentesis of the membrana tympani when we come to chronic aural catarrh.

I have purposely avoided as much as possible dividing into different forms acute aural catarrh, for practically its division is of very little importance. The drum head itself may be alone implicated (myringitis), giving rise to deep-seated tearing pain in the ear, with a feeling of throbbing and fulness, and severe tinnitus aurium. These symptoms are more or less severe; bleeding from the ear often takes place, and will sometimes cure the patient, or it may go on in other cases to suppuration and perforation, and is oftentimes followed by thickening of the membrane. There is of course also a chronic form of this disease.

H. P., æt. 18, came to the hospital with acute inflammation of the tympanic membrane of the right ear, which came on after a cold bath. Had been slightly deaf for three weeks, but three days ago felt violent pain in the right ear; said it was as if it was stuffed up, and there was a beating kind of pain deep down in the ear; also had severe tinnitus. Heard watch only in contact. The drum head was of a bright pink colour, but the external meatus was perfectly healthy. Two leeches were applied in front of the tragus, and a warm weak solution of carbolic acid was frequently poured into the ear. The leeches gave immediate relief, the membrane recovered from its highly vascular state, the slight discharge ceased, and in ten days' time he was perfectly well.

Supposing, however, that cases of the more serious forms of inflammation have been allowed to take their own course, what are the consequences in the

majority of instances? The membrana tympani, although ruptured, will readily heal when a little care is taken, without any serious after effects of any kind; but if the discharge is allowed to continue, will the patient "grow out of it," as is commonly asserted? On the contrary, in 99 cases out of 100 some mischief must result. Thickening or perforation of the membrana tympani; chronic inflammation of the mucous membrane of the tympanum and constant otorrhœa; injury, or perhaps total destruction of the ossicles; extension of the inflammatory process to the brain, &c., &c., &c., may supervene. After fevers a sanguineous fluid may fill up the cavity of the tympanum, perhaps causing complete disorganisation and total deafness. One of the most common cases brought, however, is perforation from scarlet fever. These often do well if you first check the otorrhœa (by the same means that I have already suggested), thus getting the mucous membrane into a healthy state. There then is a fair chance of healing up the orifice in the tympanic membrane by the application of nitrate of silver, &c. If an attempt is made to close it before the discharge has ceased, more harm than good is done, shutting up the pus, and making, as it were, an artificial abscess.

Quinine in large doses sometimes causes an acute inflammation of the mucous membrane of the tympanum and Eustachian tubes. The following is a case in point:—

The Rev. T. P. came to consult me in June, 1874. A short time before, he was taken ill in Rome with fever, and was given large doses of sulphate of

quinine. Shortly afterwards, singing in the ears and deafness came on, which had been gradually increasing. He had a slight discharge, and a great deal of pain in both ears. Could not hear watch in contact on either side. The mucous membrane of the throat was very congested; the Eustachian tubes closed completely; and both tympanic membranes looked bright red in colour. After a little perseverance I was able to open both Eustachian tubes by means of Politzer's air-bag. His hearing immediately improved six inches, and his recovery was completed by the use of a weak carbolic acid lotion for the ears, an application of tinct. ferri. perch. ʒi to the ℥i of water for the throat, and the discontinuance of the quinine.

Roosa, in writing on this subject, says: "I am inclined to suspect the effect of quinine upon the ear is sometimes an inflammation of the conducting portions of well as of the acoustic nerve or labyrinth. We have long known of the latter effect, but the former has not been often observed. I have been convinced by experience that it has a peculiar power of congesting the auditory apparatus."*

The external meatus itself may be diseased (otitis externa). This is most frequently met with in children after scarlet fever, small-pox, &c., &c. Again, it is often brought on from bathing in cold water.

* "Treatise on the Diseases of the Ear," by Dr. B. St. John Roosa, M.A., M.D., p. 504.

Chapter III.

CHRONIC AURAL CATARRH.

Chronic aural catarrh is by far the most frequent cause of deafness. In the last chapter I pointed out the great variety of cases that may be met with, and how difficult it is to define clearly the various forms of this disease, especially when we remember some of those indefinite cases in which it is hard to say where the acute inflammation ends and the chronic form begins. Chronic catarrh may therefore be a result of the acute disease, or it may arise from inflammation of the external meatus or the membrana tympani, advancing inwards to the tympanum. This is what is called "chronic otitis media," or chronic suppurative aural catarrh. There may be more or less pain or difficulty of hearing, and there is always a suppurative discharge, and generally a perforation of the membrana tympani.

The way in which the orifice is made is well described by Allen when he says: "What is the pathology of chronic catarrh of the tympanum? In the first place we find that it results from an inflammatory state of the throat, which may have been either acute or sub-acute, and in these cases the mucous membrane of the cavity undergoes the process of hypertrophy. This thin and delicate investing membrane, naturally so fine as to require the sense of touch in aid of sight, even to determine its

presence, may become so vascular, congested, and thickened as nearly to fill the whole cavity. From being like a piece of the finest tissue paper, says Toynbee very truly, it becomes more like velvet. In these cases, the Eustachian tube having been implicated in the catarrhal process, this fluid cannot escape naturally, and should it not become absorbed, it may, by pressure upon the membrana tympani, produce an orifice there and run out into the external meatus."

The more simple form of mucous catarrh is what I shall first take, beginning with cases that can be overcome by Politzer's process, &c., and then going on with those not so recent (or, perhaps, of long-standing) where it is necessary to inject fluids, &c., into the tympanum to cope successfully with excessive secretion, swollen tissues, or hypertrophied mucous membrane, and I shall describe more fully chronic suppurative aural catarrh when we come to the important subject of otorrhœa.

It is remarkable how children suffer from simple mucous catarrh, and even more astonishing is the number of those that are permitted to neglect all remedial measures until they become perfectly deaf. The most successful results are obtained from early treatment. As I have said before, it is the more important to impress this constantly on the minds of people now-a-days, that there is a generally received notion that children as they grow older or stronger, or less delicate, &c., &c., will gradually get rid of their difficulty of hearing. Very slight pain (if any) is experienced by these patients, and they are, therefore, I suppose, led to believe that no serious con-

sequences can result, whereas they gradually get deafer and deafer from the ever-increasing disease. It is not therefore surprising that if mucus be permitted to accumulate and harden, if the drum-head becomes thickened, or that, if the ossicles are glued together, lamentable effects are produced.

Another reason why this state of things is often allowed to go on in children is from a general belief of parents that the child, instead of being hard of hearing, is absent, or stupid. Most children are said to hear more than they are wished to hear, and it is absurd to suppose that any are voluntarily deaf. Many cases are recorded in which serious consequences have taken place from this mistaken notion. A case is related for instance (in Holmes's "System of Surgery"*) of a youth who died with caries of the petrous bone and abscess in the cerebrum, and in whom the symptoms of aural disease dated from early life, from his father being in the habit of boxing his ears "for inattention."

The first case that occurs to me is that of Master R., aged 9, sent to consult me by Dr. Broadbent. Had been in a delicate state of health for some considerable time, and had suffered from deafness for two years, which had been getting gradually worse, increasing very much lately, so much so that he could hardly hear the watch in contact with either ear. His throat was very relaxed, and the tonsils enlarged, and he was generally in a very weak state of health. He was very absent, and could not hear general conversation. He snored in his sleep and breathed heavily, and was said "to talk through his nose." In this case

* Vol. 3, p. 171.

the Politzer bag afforded immense relief; it was regularly used twiee a week. His hearing quiekly improved, for after three weeks' treatment he eould hear sounds 12 inehes off on both sides. He derived great benefit at the same time from taking ʒi each of eod-liver oil and steel wine three times a day. His throat was painted daily with ʒi of tinct. ferri pereh. to ʒi of water. He then left for Germany for six months, but on his return came to eonsult me again, when his hearing distanee was four inches left, seven inches right. The same treatment was again pursued, and in a very short time his hearing distanee was five or six yards with both ears, or, in other words, he could hear perfeetly.

This is typical of a very great number of eases that one is eonstantly meeting with in practiee. Some, of eourse, take longer to deal with suecessfully, while others, again, are eured almost with one application of the bag. It is important at the same time to remember that half the battle depends on attention to the general health of the patient, and in relieving the eongested mucous membrane by astringent applications to the throat. If parents only knew how easily, as a rule, their ehildren are eured, and on the other hand, that if negleeted when young a more serious and oftentimes ineurable form of deafness will gradually supervene, diffieulty of hearing would be far less eommon than it is.

The following is an interesting ease, and one that is not at all unfrequently met with:—

M. L., aged 14, came to eonsult me at the Hospital. Had been ailing and getting gradually deaf for two years, from the time she began to menstruate; was

POLITZER'S AIR-BAG, WITH ALLEN'S NASAL PAD.

very anæmic; had no appetite; there was constipation of the bowels and a very relaxed state of mucous membrane of the throat. She was very deaf, and could not hear my watch in contact with either ear. For the last six months the menstrual periods had ceased, and from that time her deafness had got rapidly worse. I prescribed the syrup of the iodide of iron and painted her throat occasionally with nitrate of silver, 2 grs. to the ʒi., and, as in the last case, frequently used the Politzer bag.

This treatment was continued for three months. Her general health was completely restored; and when I last saw her at the hospital she could hear perfectly.

And now a few words as to the use of the Politzer bag. This useful instrument was invented by Dr. Adam Politzer, of Vienna; it has rendered the Eustachian catheter unnecessary in a great number of cases, and moreover is much more easily used

than the latter instrument. I prefer the Politzer bag with Allen's nasal pad attached, which can be pressed against the nostrils. I find patients submit to this much better, for it is much less disagreeable to them than having a tube inserted half an inch into the anterior nares, at the same time that pressure is made with the fingers on both alæ nasi.

Allen remarks that by this means currents of air may be blown into the pharyngeal cavities, and this will force the warm air therein contained to enter and pass through both Eustachian tubes into the tympanum. The act of swallowing, as we know, opens the tubes, and the compressed stream of air is sufficient to overcome any obstructions of moderate extent in the tubes. When the resistance to the full entry of air is not great the patient feels suddenly a considerable pressure in the drum, and a noise is heard like an explosion of a gun; and hundreds of cases which formerly escaped efficient local treatment we are now enabled to relieve or cure by the help of this most excellent substitute for the catheter. In young children it is not necessary for them to swallow at the same time that the bag is used, and when they are very young it will be found quite sufficient for every purpose (as Hinton first suggested) to use a piece of india-rubber tubing, blowing air from your own lungs instead of using the bag—a proceeding quite as efficacious and not as likely to frighten them.

Since the above was first written, a very able paper appeared in the "Medical Times and Gazette," January 1st, 1876, which I extract in full with every acknowledgment to the learned author.

On a New Method of making Pervious the Eustachian Tube and of Inflating the Tympanum.

By Professor Joseph Grüber, M.D., Aural Surgeon to the Imperial General Hospital of Vienna.

"The chief difficulty in catheterising the Eustachian tube—that beneficent operation which I may here emphatically say will never be superseded in practice—lies, as is well known, in the often obstructed condition of the nasal meatus. The turbinate bones and the septum nasi, which mainly contribute to form the meatus, are in size, shape, and position such variable structures that they cause the proportions of the nasal meatuses to vary immoderately, and sometimes render the passing of a catheter so difficult, that it requires, in addition to a very nice sense of touch in the fingers, which indeed is a specially indispensable qualification of a good operator, also considerable practice and ample experience to enable one to perform this operation with the requisite adroitness.

To acquire, fairly, dexterity of this sort is not an easy matter, for the dislike of the patient to instrumental treatment is augmented by the thought that the operation is going to be on his head, "in the neighbourhood of the brain," and, besides all that, deep down in parts that cannot be seen. Hence the always small number of practitioners who understand properly how to pass the catheter.

Furthermore, if we consider that there are patients who lack sufficient courage to submit themselves to catheterisation, even at the hands of the most ex-

perienced and skilful of operators, and that, moreover, cases present themselves where the passage of the catheter through the nasal meatus, whether by reason of congenital or acquired deformity, or on other grounds, is impossible or inexpedient, we shall gladly welcome any method which enables us to attain, without the assistance of the catheter, objects which otherwise could only be achieved by the employment of this instrument.

One of the chief aims that we commonly have in view in passing a catheter is to blow air through the Eustachian tube into the cavity of the middle ear—a procedure which is briefly designated as the air-bath, and the employment of which in aural surgery, as is pretty well known, is, of all the means of treatment that we as yet are aware of, that which is the most often indicated and the most frequently used. And, in short, it is consequently desirable that we should know of some means of giving the air-bath, which would permit of our attaining the same, or at least approximately the same, end without the introduction of the catheter into the Eustachian tube.

The method which has of late years been employed with much success for this purpose is that which was first described by A. Politzer. This, as is well known, is as follows:—The patient having taken a small quantity of water in his mouth, the end of the nozzle-piece of one of the india-rubber bags, which Leiter (the instrument-maker) has specially constructed for the purpose, is passed about half an inch up the nose; the nostrils are next hermetically closed on the nozzle-piece by means of the thumb and forefinger of the operator's left hand, and

then, during the swallowing of the water, which the patient has to perform at the command of the operator, the latter, holding the bag in his right hand, suddenly compresses it.

According to the generally entertained views on the subject, the upper part of the pharynx at the moment of the act of swallowing is by the contraction of the structures of the throat completely cut off from the lower portion of the pharynx, and at the same time the tuba Eustachii opens, whereby it happens that the air compressed in the nasal cavity, being prevented from escaping in other directions, passes through the tube into the cavity of the middle ear.

In spite of the very valuable gain which practice has derived from this method, it nevertheless presents many drawbacks, to which we shall refer further on, when we have described the new method.

Lucae* more recently, on the basis of observations on the function of the soft palate and the Eustachian tube, which observations he had the opportunity of making by direct inspection of the functional parts in the case of a patient who presented an extensive deficiency of the nose, recommended that for the inflation of the tympanum the nozzle-piece of the bag should be introduced into the nose just as in Politzer's method, and that while the patient intoned the vowel *a* the bag should be compressed. During the phonation of the vowel *a* the soft palate becomes tense and shuts off the upper pharynx, and then air

* Prof. Dr. Aug. Lucae, "On the Function of the Tuba Eustachii and Velum Palati,"—Virchow's "Archives of Pathological Anatomy, Physiology, &c.," vol. lxiv.

can be forced, as in Politzer's method, through the tube into the tympanum.

I purpose referring again in another place to these labours of the distinguished author, and will here only briefly mention that I have convinced myself that it is possible in many cases to drive some air into the tympanum in the manner described, and that, as the author himself specially pointed out, this method may be useful in the treatment of small children.*

In the treatment of adults, namely, when it is a question, as in such cases it is apt almost always to be, of overcoming a stronger resistance in the tube, the method recommended by Lucae is certainly not easy of accomplishment. For in the case of morbid changes in the tube—and with such we have chiefly to deal—the air entering the pharynx quite easily overcomes the obstacle offered to it by the slight tension of the soft palate during the phonation of the vowel *a*, and finds vent downwards without getting through the Eustachian tube into the tympanum.

In order that the air may enter the tube with the requisite force, it is indispensably necessary that the closure of the upper pharynx should be such as is capable of offering a strong resistance; and to attain this in a simple manner a mere swallowing movement, or some movement analogous to it, is sufficient; and since in the employment of the swallowing movement, as in Politzer's method, I have found many disadvantages, I thought of an analogous one,

* Indeed, in the case of small children, it often happens that mere compression of the bag suffices to drive air into the tympanum. This fact was first noted by Schwartze, and has since been confirmed by every author.

and I believe I have found a better one for our purpose.

I will now proeeed to describe it, giving at the same time the description of the method which I shall recommend in assoeiation with it.

It relates, as I have often mentioned, to the best possible closure of the upper from the lower pharynx, in which the muscles of the soft palate and co-ordinately the muscles of the tube shall enter into action. All this is attained by simply pressing the root of the tongue against the hindermost segment of the palate, if at the same time a powerful expiration is performed. In pressing the hinder segment of the tongue against the palate the cavity of the mouth is eut off from the throat, and at the same time the soft palate is pressed upwards and backwards. The air which, owing to the simultaneous expiration, enters the throat, finds egress neither through the mouth nor through the nose—a fact which may be readily proved by holding before the nose at the same moment either one's hand or a small flame. The flame is not disturbed even in the slightest degree, and the hand does not perceive the least sensation of a breath of air during the expiration, whieh, however, it eertainly would if air issued from the nose. The stronger the expiration, the more tense is the soft palate rendered by the air that passes from the lungs into the throat, and so much the more resistant is the closure of the upper pharynx. This moment, on aecount of the position of the structures of the throat, would be the fittest for imparting the greatest possible foree to air foreed out of a bag inserted in the nostril.

If we always had perfectly tractable patients to deal with, we would certainly employ this position. However, as this is not the case, we must be contented with such movements as approach as nearly as possible those just described, and these, according to the studies which I have made as to this point on myself and on patients, are those which are caused when we pronounce the consonants *hck* (= *hkk*) in the most accentuated manner. Since, however, even with respect to this, it is necessary to have regard to the varying intelligence of patients, and since it is not always a matter of the firmest closing of the upper pharynx, and since it is easier for the surgeon if he directs the patient to repeat after him a full syllable, he can intercalate a vowel as in *hack*, *heck*, *hick*, *hock*, *huck*.

If we pronounce the above-named syllables in the order here written down, we may convince ourselves that the tongue becomes drawn further backwards and more strongly upwards as we proceed with the list of syllables, so that with the syllable *hack* the tongue is most forward, at the syllable *huck* it is pushed furthest back to the upper part, and that in like proportion the upper pharynx is contracted and forcibly shut off. The closure is still more forcible, and carried further backwards, by the pronunciation of the consonants *hck* than it is by the syllable *huck*. We have therefore in this series a gradation, or, as it were, a scale of closure of the upper pharynx, which, as we shall see later on, is very useful.

As the reader has already noticed, the syllables are always written with *ck* (or equally *kk*), to which I need scarcely add that the *k* must be strongly accen-

tuated. In proportion as the speaker may please to strengthen this emphasis, so is he thereby, and indeed very considerably, enabled to close firmly at his pleasure the upper pharynx.

If we now attempt to pronounce one of these syllables we notice peculiar changes in our ears. We remark each time a distinct movement in the membrana tympani, and by no means unfrequently a noise resembling that produced by the Valsalvian experiment. It consequently follows that in this experiment also the air must enter by the tube into the tympanic cavity, and that the tube during this experiment is opened.*

The details of the method which, based on all these data, I now recommend for the above-mentioned and other analogous purposes are as follows:—

The operator stands, or sits at his convenience, face to face with the patient. The end of the nozzle-piece of a rubber bag, which the operator grasps in his hand, is introduced into the inferior nasal meatus of the patient for about half an inch, and the operator at once hermetically closes the nostrils on the nozzle-piece of the bag with the fore and middle finger of his other hand, and while the patient at the word of command pronounces one of the before-named syllables (*hack*, *heck*, *hick*, *hock*, *huck*, *hck*), the bag is squeezed. Thereupon the air passes with a distinctly perceptible noise through the tube into the cavity of the tympanum.†

* I have as to this matter made a series of manometrical experiments; they are not fully completed, and I reserve the account of them for a future opportunity.

† For this procedure I make use of a bag which differs from

The noise which is produced by the forcible entry of the air through the tube can be auscultated with precision by means of the otoscope. In cases where the membrana tympani is perforated, the well-known perforation sound is produced. The patient feels a distinct sensation of the entry of the air into the tympanic cavity. The membrana tympani exhibits, on inspection, quite distinctly the well-known appearances—in short, all the signs of an entry of air into the middle ear having taken place are present, provided the tube is not impermeable in such a degree as to resist also other modes of procedure.

If, during this procedure, I cause the patient to incline his head strongly towards one shoulder, it almost always happens, especially when I insert the bag into that nostril which corresponds to the ear in which I desire to drive the air, that the air flows into the ear directed upwards—that is to say, the one that is turned away from the shoulder. In cases where the air also entered the other ear, it nevertheless almost always happened that the patient felt the air more strongly in the upward-turned ear. If the patient with this kind of procedure had once confidentially declared that he felt the air in one ear, he had also the same sensation if I repeated the trial, either several times in succession or on different days. Whether in this particular position the muscles

Leiter's, in that the nozzle-piece is quite solid, and screwed into the bag. In Leiter's nozzle-piece there is between the proper nose-piece and the bag a piece of india-rubber tubing. I find this modification very disadvantageous, for the bag is thereby rendered not only more difficult to handle, but the nozzle-piece cannot be so readily cleansed. Bags such as I use are always in stock at Leiter's, as well as at Reiner's in Vienna.

of one side possibly act more energetically, or whether the forced-in air more readily follows the upward direction, or whether in this position the expired air exercises a stronger pressure on the one-half of the soft palate, and so shows the way to the air driven in through the nose, I am unable to say. I would also make these latter statements with all reserve, and only point them out since it would obviously be of inestimable value if we had a means of this kind by which we might be able to drive air through only one tube. To sum up, the advantages possessed by this process as compared with Politzer's are as follows :—

First, it is much simpler, the swallowing motion being no longer required. There is no swallowing of water either. To appreciate this boon, one ought to be acquainted with the unspeakable loathing patients, as a rule, evince for drinking the water, although I have practised this process much less frequently than others. A large number of glasses used to stand in readiness on my consulting-table, and yet patients used to be compelled to make an almost superhuman effort just to sip water out of my glass. Indeed, we cannot well blame them for this if we take into consideration that a practitioner's consultation-room must be accessible to all patients, let the nature of their diseases be as contagious as it may.

Apart from this, however, if the process is to be repeated more frequently, the swallowing of water becomes not only troublesome, but actually painful. To the objection that the patient might make a swallowing motion even without water, I reply that in such cases the driving in of air through the tubes

proves often unsueeessful, and that the repeated unsubstantial swallowing is even more painful than the swallowing of water. We will say nothing of eases in which, owing to eoneomitant throat diseases, the swallowing is painful; neither need we dwell upon the faet that when sueh an attempt is made the air not unfrequently gets into the stomaeh, produeing violent pain, which does not subside until the stomaeh has diseharged this air by repeated erueta-tion.

2. By keeping the throat struetures for a more protraeted period in the position of the ending of the syllable (*i.e*,, of *k*), one is enabled to let the air pass somewhat longer through the tubes into the eavity of the tympanum, whieh is perfeetly impractieable during the short aet of swallowing, which, as it is well known, eannot be protraeted.*

3. Taking the above seale into eonsideration, the air may be pushed with any amount of power at choice through the tubes; and this advantage is to be valued all the more that we know that, owing to the rapidity with whieh Politzer's proeess—if it is to suceeed at all—must be put into operation, the membrane of the tympanum has often been ruptured.

4. This process, if applied to self-treatment, must needs be mueh more advantageous, sinee the patient, guided by his own feeling, may intensify at will the pressure of the air entering the eavity of the tympanum.

I now beg to reeommend this proeess to my highly

* I hope that in this manner it will be possible to introduce some other medicaments into the middle ear. (Grüber.)

esteemed *confrères*, hoping that they also will make their experience on the subject public."

For my own part, I admit I am unable as yet to express an opinion on Professor Grüber's method above described; but it is no doubt worthy of attention, coming, as it does, from such a high authority.

What do we hear then (with the aid of the otoscope) when the air is forced through the Eustachian tube and tympanum and impinges on the tympanic membrane? A peculiar "thud." Of course, if fluid is present, you can distinguish a gurgling sound; if the membrane is perforated a peculiar whistle is heard. Practice alone enables the surgeon to recognise these various sounds.

Some children who may be perfectly well in their general health (unlike the cases I have given above) nevertheless suffer from chronic catarrh. They, too, breathe heavily, snore in their sleep, or "talk through their nose." Their throats also are affected; often they have enlarged tonsils, and sometimes the removal of these glands will complete a cure. Generally speaking, they have red granulations covering the naso-pharyngeal cavity. Dr. Mayer says the patient's voice is singularly wanting in resonance, and the usual consonants cannot be pronounced, exactly as in a common cold, patients thus affected being unable to pronounce the nasal sounds "m" or "n," will say "cobbod" instead of "common," "dose" or "lose" instead of "nose," "sogg" for "song" and being likewise unable to breathe

through the nose, they are compelled to keep the mouth continually open.

Removal of the tonsils,* if very large, the frequent use of the Politzer bag, and astringent applications to the throat, will be found all that is necessary for the cure of these cases of deafness.

Accumulation of fluid in the tympanum is not so common in adults as in children, but it is frequently met with. The state of the weather has a marked influence on these cases, cold and damp especially affecting the hearing power, causing hyperæmia,

* Sir James Paget ("Medical Times and Gazette," Feb. 6, 1858), makes the following remarks:—"There is a physiognomy by which the children and young people that have simple enlargement of the tonsils may usually be known at once. Together with a general appearance of feeble health they have a peculiar shape of the mouth and jaws. The jaws are narrow, so that the teeth are crowded and look disproportionately large. The aperture of the mouth is small, habitually slightly open; the edges of the lips thick, but not pouting, the lower lip rather inverted; the angles of the mouth a little raised; the front of the mouth is almost uniformly convex; the lower lip scarcely recedes towards the chin, but projects with a broad convexity, as if its middle part were slightly pushed forward by the tip of the tongue. The general expression is that of a gradual narrowing and a smooth uniform rounding of the lower part of the face, which make it look small and featureless.

"These peculiarities of shape appear due, partly to defective growth of the jaws, and partly to the habit which the patients have of advancing the lower jaw and tongue, in the position in which these parts are yet more evidently held during acute inflammation of the tonsils.

"For chronic enlargement of the tonsils, whether through simple over-growth or in consequence of chronic inflammation, the excision of the projecting portions seems by far the best treatment. So far as I have seen the cutting of tonsils is never followed by severe hæmorrhage or other serious inconvenience, provided they are not inflamed at the time of being cut. And I believe that if other means of reducing the size of enlarged tonsils be not quickly beneficial, the excision should be adopted both oftener and earlier than it commonly is."

with swelling of the tissues, and increased secretion, and thereby closing the Eustachian tubes.

Von Tröltsch gives an excellent description of the effect produced by long closure of the Eustachian tubes, and also the appearance of the membrana tympani in these cases of what he terms moist catarrh. He says :* "Should the closure of the tube continue long, it necessarily exerts an injurious influence on the deeper seated structures of the ear. As the air confined in the tympanum becomes gradually absorbed, atmospheric pressure acts upon the outer surface only of the membrane, which thus becomes unnaturally forced inwards, and with it also the chain of ossicula, and especially the foot of the stapes. By the abnormally increased pressure upon these structures, the membrana tympani, the ossicula, and the contents of the labyrinth, changes are necessarily produced in their structure and equilibrium, which may remain even if the normal communication between the ear and the pharynx is again restored. The membrana tympani appears abnormally concave, deeply sunken in, or, more correctly, forced in. In many cases the membrana tympani, though in no way altered in colour, gives an impression as if it were thinned or atrophied, and then the long process of the incus, which may be almost in actual contact with the membrana tympani, behind and parallel to the handle of the malleus. is very plainly visible through it. If a marginal thickening of the mucous coat of the membrana tympani has taken place in the earlier stages. the centre and periphery differ extremely from one

* "Diseases of the Ear," p. 51.

another in colour and curvature. Whilst a wide marginal zone of denser tissue and whitish-grey appearance remains in its normal plane, the translucent, thin, greyish-red centre, bounded externally by a sharp line, projects, funnel-like, inwards."*

I have seen cases of various forms of chronic catarrh in children noticed, and I will now take a few instances of the malady occurring in adults, with obstruction of the Eustachian tube, &c.

Some patients with simple obstruction of the Eustachian tubes, when treated at once, recover even from one application of the bag. The following cases are good examples:—

R. G., Esq., sent to consult me by Dr. Langmore. Had had deafness a few days in right ear. After the use of the Politzer bag he regained his hearing, and the deafness did not subsequently return.

Dr. P. came up from the country to see me for deafness in both ears, which he had had for three weeks. Could not hear my watch in contact with either ear. The bag caused a "tremendous explosion," after which he could hear as well as ever. An astringent application for the throat was prescribed, and the deafness did not return. He had previously consulted Toynbee and Hinton for the same affection with similar result.

These cases can hardly be termed chronic; I mention them because they show how the malady generally begins, and also how much more easily we are enabled to relieve such patients by early treatment.

* Dr. von Tröltsch's "Diseases of the Ear," translated by J. Hinton, M.R.C.S.

The next case is that of Mrs. G., who had been deaf for two months in both ears, from getting cold. Said that "she thought that if she left it alone she would get rid of it, but finds she is getting rapidly worse." The symptoms and treatment are very much the same in all these cases, but what I want especially to point out is the rapid improvement derived from the use of the Politzer bag. I made the following notes:—

Feb. 2nd. *Hearing distance:* Not in contact with the right ear, ½ inch from the left.
3rd. 2 inches right, 2 inches left.
4th. 8 inches right, 6 inches left.
7th. 24 inches right, 16 inches left.
9th. 3 feet right, 2 feet left.
12th. Quite well.

R. O., Esq., æt. 21, came to consult me for deafness. States that two months ago he caught a severe cold, and has been deaf ever since, and is getting worse. Is not in good health. Mucous membrane of throat is very relaxed. Both Eustachian tubes are completely closed.* After Politzer's bag had been used he heard a loud report in both ears, after which he heard well. An alum gargle, gr. x.

* Mr. Dalby, of St. George's Hospital, a leading authority on Diseases of the Ear, in page 48 of his treatise so entitled, furnishes an excellent idea of the appearance of the membrana tympani in a case of obstruction of the Eustachian tube due to catarrh of its lining membrane. He says:—"I can compare this appearance to nothing better than if a sail of a boat (the foresail, for example) was supported on its leeward side by a spar, one end of which was fixed against it about its middle. The puckering produced by this object would represent in a rough manner the puckering of the membrane."

to the ʒi., was ordered, and quinine and iron also prescribed.

The effect soon passed off, and he became as deaf as ever. Politzer's bag again used. Hearing distance 4 inches right, 12 inches left. Ordered to paint his throat every morning with tinct. ferri perch. ʒiss. to ʒi of water, and also to paint behind his ears with iodine liniment. He attended regularly, and derived benefit from every application of the bag. His throat and his general health improved considerably, all signs of fluid in the tympanum disappeared, and the last time I saw him he could hear several yards.

The next case is that of A. R., Esq. Deafness one month after severe cold. Hearing distance, 1 inch with right ear, in contact with the left. Both membranes concave, and dark grey in colour. Had pharynx and nasal passages red and congested, and severe noises in both ears. After the use of the Politzer bag the hearing distance improved, 2 feet right, 1 foot left, but, as in the last case, two days afterwards the deafness returned. He was ordered an application for the throat of nitrate of silver, grs. ii to the ʒi, also to paint behind the ears with iodine liniment, and to take a quinine and iron mixture. The bag was regularly used twice a week, and in six weeks' time he could hear perfectly.

The following winter he caught cold, and became quite deaf again. He, however, took care to have it attended to at once, and in a very short time, by the same treatment as before, he recovered.

B. R., æt. 55, came to see me at the hospital. Said that five months since she caught a severe cold, after washing her head, just before she went to bed.

Next day she had great noises and deafness in both ears, which had increased in severity. Hearing distance, in contact with left ear, but could not hear the watch with the right ear. The same treatment was adopted as in other cases, from Feb. 3rd to March 27th, when she left the hospital well.

Chapter IV.

CHRONIC AURAL CATARRH (*continued*).

I NOW come to some of the more severe forms of chronic aural catarrh. In the last chapter I endeavoured to point out the great benefit derived from the use of Politzer's air-bag in the milder forms of this disease, and now I shall take cases of a more serious character, where the use of the Eustachian catheter is necessary.

Not only in severe cases of chronic aural catarrh, however, is this instrument of the greatest service—but occasionally we meet with patients with impervious Eustachian tubes (and deafness more or less will continue as long as they remain closed), where Politzer's process fails altogether to overcome the obstruction, but where, on the other hand, immediate relief is afforded by passing the Eustachian catheter. When the tube is again pervious, air is admitted into the tympanic cavity, and at the same time any abnormal secretion that may have been pent up by the complete closure is allowed to escape. If mucus, pus, &c., be permitted to remain undisturbed in the

tympanum, we can easily understand what vicious results are likely to take place, eventually leading to permanent deafness.

How important it is, then, to be able to pass the Eustachian catheter, yet how few medical men are able to do so satisfactorily! By far the easiest and best way of learning to use this instrument is, I believe, to pass it in the manner first suggested by Dr. Löwenberg. He recommended that the instrument, after it had reached the pharynx, should be turned inwards (instead of outwards) till it hooked itself behind the vomer, and as it could then be withdrawn no further, to turn it completely round at right angles, and the point of the catheter would be placed in the exact position sought for, viz., in the mouth of the Eustachian tube.

If the instrument, after reaching the pharynx, is withdrawn in the ordinary way, with the point turned outwards until the orifice of the Eustachian tube is found, great difficulty is frequently experienced. The instrument is not withdrawn far enough (or may be too far), or perhaps the point is inserted into the fossa situated behind the Eustachian tube.

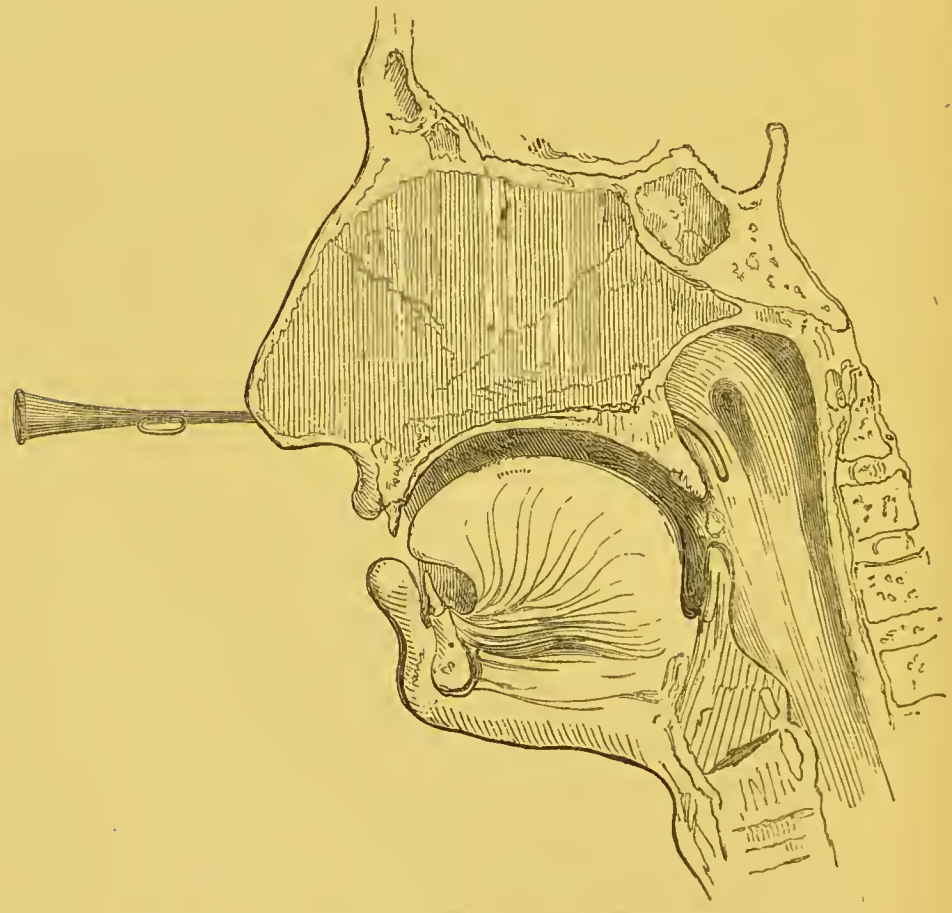
It should be remembered, also, that

EUSTACHIAN CATHETER.

F 2

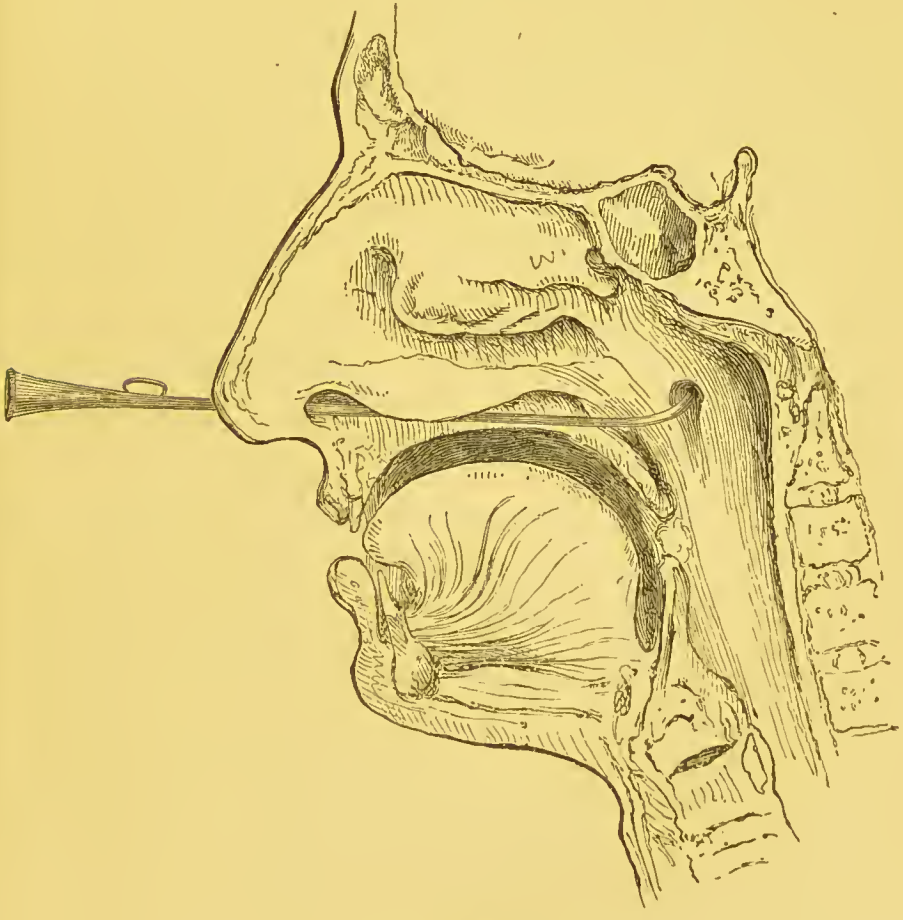
the mucous membrane in nearly all catheter cases is in a delicate state, oftentimes highly sensitive, so you can imagine that constantly moving the instrument backwards and forwards adds considerably to your difficulty.

Warm the catheter in hot water and introduce it into the inferior meatus of the nose (and this is best done by depressing the patient's lip), pass it along the floor of the nares until it reaches the posterior



THE EUSTACHIAN CATHETER TURNED INWARDS AND HOOKED ROUND THE VOMER.

wall of the pharynx, taking care to keep the instrument at right angles with the plane of the face, withdraw it until the septum nasi is felt; if it is then rotated with the point downwards to the opposite side, that is, turn it outwards and a little upwards (and this position will be shown by the ring at the other end of the catheter), the mouth of the Eustachian tube will be easily found.



THE EUSTACHIAN CATHETER IN POSITION.

I have passed the Eustachian catheter several thousands of times in this manner with the greatest ease. I am confident it is by far the better plan, for in the out-patient department I have taught gentlemen readily enough in this way; whereas by the other mode they always experience difficulty in learning. I should not forget to mention that the patient should be placed facing the light, in a chair with a high back, against which the head can be firmly rested. The Eustachian catheter should never be passed on young children; it is unnecessary, very difficult, and, moreover, dangerous, for one can never by any means induce them to keep still. I very rarely use it for any patient under 15 years of age.

What are the difficulties and dangers that arise from the introduction of this instrument?

Excessive narrowness of the nasal fossa. Extreme sensibility of the pituitary membrane, and the pain produced by the least touch. From using a too large or too curved an instrument, or giving it a wrong direction, are some of the difficulties given by M. Triquet,* and the accidents arising from the operation he divides into local and general.

The local accidents are:—

1. Laceration of the inferior part of the nasal canal: it causes only slight pain and one or two drops of blood.

2. Extraordinary sensibility of the pituitary membrane, which may bring on sneezing, or may render the contact of the catheter very painful.

3. Excessive lachrymation.

* "Journal of Practical Medicine and Surgery."

4. A few drops of blood often flow during the operation, probably from the Sehneiderian membrane being laeerated, or in some subjeets where the mucous membrane is red and inflated the simple contact of the instrument may give rise to a true epistaxis, whieh may always be promptly arrested by the inspiration of a little eold water.

5. Nervous cough.

6. As a result of simple or granular ehronie pharyngitis, the tonsils may have remained hypertrophied, and it is not uncommon to meet with a spasmodic contraction of the pavilion of the Eustaehian tube, when the eatheter is about to enter the orifice. In nervous subjects, as soon as the eatheter touehes the pituitary membrane, the velum palati is eonvulsively drawn upwards. During these violent eontraetions, whatever be the cause, the peristaphyline museles, inserted near the mouth of the Eustaehian tube, eompletely effuse the opening, so that an instrument eannot pass it without effort.

7. If the surgeon employ too mueh foree to overeome the eontraction of the muscles, the mueous membrane may be torn, so as to give rise to the produetion of emphysema at the first attempt at deglutition or inspiration. The symptoms resemble œdema of the glottis in its last stage. On foreibly drawing down the tongue with the finger, there is pereeived to be considerable emphysema, raising the whole of the mueous membrane of the pharynx, and even invading the larynx, espeeially the arytæno-epiglottie folds. It is requisite only to tear with the nail of the finger whieh holds down the tongue one of the emphysematous projections of the mucous

membrane; the air escapes and the patient recovers.

8. Rupture of the membrana tympani.

The general accidents are—rigors and fever, facial neuralgia, obstinate headache, and an increase of the deafness, &c. Suspension of the treatment is generally sufficient to arrest these accidents.

Having now described what I consider the best means of passing the Eustachian catheter, and some of the difficulties that may be met with in the operation, I pass on to the various forms of chronic aural catarrh where the use of this instrument is appropriate. I will, however, first begin with a case of obstruction of the Eustachian tube, on which we are unable to make any impression by Valsalva's or Politzer's process, but which yields readily enough to the catheter. It is well to remember that where we meet with patients whose hearing varies from time to time, we may be almost certain that the mischief is to be found in the Eustachian tube and not in the tympanum. The congested state of the mucous membrane of the tubes being increased (especially in damp weather), extra secretion is poured out, and the mucous surfaces meet and thus exclude the air.

"A. D., aged 69, has been deaf four months. It came on first from taking cold from sitting at an open window. Both tubes are closed. Politzer's process of no effect. Cannot hear watch in contact right ear. Hears one inch left. Catheter passed, and repeated twice a week for three weeks. She rapidly recovered her hearing, and the last time I saw her says 'she can hear as well as ever.'"

"J. F., a painter, aged 40, had attended at St. Mary's for a great many years, formerly under Toynbee and Allen, and latterly under my care. His hearing varies from time to time, but suddenly, about every six months or so, he gets very deaf, and comes to the hospital to get relief from the catheter. The Politzer bag does not make the slightest impression on him, but directly the catheter is passed and the air-douche used, he says "he hears a bang," and his hearing comes back. He is ordered a strong astringent application for the throat (argenti nitratis, gr. x, to ℥i), and he gets almost well again. He is able to keep the tubes open by Valsalva's process with comparative ease for some months, until damp or foggy weather again brings on a total obstruction of the tubes."

In these cases there is always great concavity of the tympanic membranes, the centre part especially being sunken inwards, and in the upper portion the short process of the malleus shows out like a pin's head.

I could repeat numerous cases of the same kind where the greatest benefit has been derived from the air-douche regularly used through the catheter.

More powerful remedies, however, are often neeessary. Fluids or vapours can be blown in like manner through the Eustachian tubes.

Thus, as Von Tröltsch remarks, "In moist swelling, and where increased secretion of the mueous membrane is present, vapours of ehloride of ammonium are most useful, best evolved in a naseent state, whilst in a dry and thiekened eondition of parts, tepid or warm water vapours, alone or with iodine,

introduced with a certain degree of pressure into the tympanum, most speedily promote reabsorption. Injections of astringent or slightly stimulating fluids (solutions of zinc, iodine, &c.) often produce the same effect, and are preferable in the case of a narrow Eustachian tube, and when a too extensive irritation of the nasal mucous membrane would be produced by warm vapours.

A. G., aged 64, came to the hospital March 31st, suffering from deafness, brought on from cold five years ago. Both tympanic membranes were concave and of dark yellow colour: the Eustachian tubes completely closed. The Politzer bag was used without any benefit. Catheter passed. Moist sounds heard in tympanum. A solution of sulphate of zinc (gr. v to ʒi) was injected into the tympanic cavities regularly twice a week, and after every application the hearing distance improved. On April 14 said she could hear the ticking of her clock, which she had not heard before for five years. On June 2nd she left the hospital with very fair hearing power.

According to Politzer, if there is little or no increase in the hearing distance, after repeated employment of the air-douche, we may infer that the deafness is caused by the sequelæ of the catarrhal affection, viz., thickening of the mucous membrane and of the coverings of the ossicula, with rigidity and diminished mobility of them, we can only expect improvement from the use of moderately stimulating injections, together with the use of the air-douche. In this state of things I have found great benefit derived from an often-repeated injection of a solution of iodide of potassium (gr. x to ʒi). For example,

in a lady (sent to eonsult me by Mr. Speneer Smith) who had been deaf for two years, the hearing improved very satisfaetorily from this treatment. The tympanie membranes were of a very dark eolour, and sunken inwards. Hearing distanee when I first saw her was 12 inehes right, 9 inehes left. Feb. 28th: 12 right, 15 left. March 4th: 15 both. 9th: 16 right, 19 left. 16th: 19 both. April 1st: 18 right, 24 left. 15th: 20 right, 24 left. The hearing distance varied after this from time to time; the best was 26 right, 25 left. In very deaf people, one ineh gained makes a very considerable differenee. In more reeent cases the reeovery from this mode of treatment is sometimes much more rapid, and where the benefit derived may be eounted in feet instead of inehes.

In some eases of a thickened eondition of parts the injeetion of a weak solution of iodine is of the greatest serviee. Thus, in E. R., Esq., who eame to consult me for his deafness. He heard my wateh 1 inch from the right ear, but was unable to hear a sound with the left. He gradually improved by this means after everything else had failed, and when I last saw him he heard 6 inehes right, 4 inehes left, and I hope to get still better results by further treatment. Weak solutions of sulphate of eopper, liquor potassæ, nitrate of silver, hydrate of ehloral, &c., &e., are often useful. Of eourse it is of the utmost importanee to seleet your remedies suitable to the condition of the patient, to the state of things observable when looking at the membrana tympani, and to the diagnosis arrived at from the various sounds heard through the otoscope, or psophometer, as some prefer to eall the diagnostic tube.

Another very successful case treated with the injection of the iodide of potassium through the catheter was a young lady, Miss M., aged 18, who had been deaf for 18 months, and was sent to consult me by Mr. Milson. Her hearing distance when she first came was—

	Right Ear.	Left Ear.
Nov. 2nd.....	8 inches.	16 inches.
Nov. 10th	12 „	16 „
Nov. 17th	12 „	20 „
Nov. 26th	24 „	20 „
Dec. 9th	26 „	22 „
Feb. 5th	25 „	30 „
Feb. 16th	25 „	35 „
Mar. 4th	30 „	35 „
Mar. 17th.....	36 „	50 „

So that in the four months she was under my treatment, her hearing improved 28 inches with the right ear, and 34 inches with the left. She did not object in the least to the use of the catheter, and attended very regularly.

Another similar case is that of Miss B., a young lady of 17, sent to consult me by Dr. Jefferson, of Market Weighton. When I first saw her the hearing distance was—

	Right Ear.	Left Ear.
	12 inches.	4 inches.
Then	14 „	7 „
Next	16 „	7 „
Then	20 „	7 „
Next	20 „	8 „
	25 „	12 „

In this case the hearing distance with the left ear remained stationary for some time.

In the treatment of these cases of chronic aural catarrh it is, I consider, always best to begin with the air-douche, and see if any good result can be obtained, before we go on with the injection of fluids. I think very often this is neglected, A lady, a short time ago (the Hon. Mrs. C.), came to consult me for deafness. She said she had seen numerous aurists in France and Germany, and that they injected all kinds of fluids through the catheter, and instead of getting better she got worse. I treated her simply by the air-douche, and she regained her hearing in a remarkable way, and lost entirely the pain and noises in her head she had previously suffered from.

There are other cases, of course, of disease of long-standing where we fail altogether to make any impression by means of the Eustachian catheter. In some of these patients puncture of the membrana tympani is said to have proved of service.

Mr. Hinton thus describes the operation,* "Whatever instrument is used, it should be introduced into the meatus through the speculum with a good light falling on the membrane, which should be punctured in its inferior portion, either in front of or behind the termination of the handle of the malleus. A small amount of bleeding follows the incision, and if the case be a favourable one, an immediate improvement of hearing occurs." He recommends a syringe fitting hermetically into the external meatus for washing out the cavity of the tympanum. Dried mucus which has collected behind the membrana tympani

* Holmes' "System of Surgery," vol. 3, p. 166.

can by this means be forced out into the Eustachian tubes or pharynx. It is very difficult to keep open an aperture made in the membrana tympani; in most cases the puncture rapidly closes up, so that unless (before the closure) you have been able to get rid of some of the inspissated mucus little good has been done.

This operation should only be attempted where other less hazardous means have been previously employed without avail, and in such cases where we are quite certain that the deafness can be relieved by the removal of the abnormal secretion which is interfering with the proper function of the membrana tympani.

A gentleman came to consult me a short time ago with facial paralysis on one side, together with almost total deafness, which came on after this operation had been performed by a surgeon in the north of England. Another patient told me that he had had both membranes punctured by an aurist every week, for a period of two months; he said "it always healed up the next day, and I am worse than I was before." Several deaths have been recorded from inflammation of the brain resulting from this operation. In speaking of puncture of the membrane for disease of the tympanic cavity, it will be well to turn our attention for a moment to the position and size of the middle ear.

The middle ear or tympanum is situated in the petrous portion of the temporal bone, immediately above the jugular fossa, and is roofed in by a thin plate of bone which separates it from the interior of the cranium. In front of it passes the internal carotid artery, which is separated from the middle ear by a

very thin osseous lamina; at this aspect also the Eustachian tube and the canal of the tensor tympanic muscle enter. At the back of the cavity are placed the mastoid cells. The outer boundary is formed chiefly by the tympanic membrane; the inner by that part of the petrous bone which separates the cavity from the cochlea and vestibule—parts of the inner ear.

The distance between the tympanic membrane and the inner wall is not more than a quarter of an inch.

Tunnelled out of the substance of the inner wall is the circuitous canal by which the facial nerve is conducted, in its wandering course, from the bottom of the internal auditory meatus to the stylo-mastoid foramen. This bony canal, or aqueduct of Fallopius, is not entirely hidden in the substance of the wall, its course being distinctly marked by a linear bulging on the tympanic side. Thin bone is heaped up all along the track of the nerve, just as in a meadow the upturned earth defines the course taken by the burrowing mole.

The position of the aqueduct, and the delicacy of its covering on the tympanic side, expose the facial nerve to great danger during an accidental or intentional puncture of the membrane. This membrane consists of three layers, the external and internal of which are derived from the epidermal and mucous linings of the outer and middle ears respectively, whilst the intervening stratum is composed of a mixture of white and elastic fibres. Supposing that a chronic inflammation of the middle ear has thickened this three-fold membrane, it will offer considerable resistance to the passage of a knife. Under the

gentle pressure of the operator's hand, however, the membrane gives way suddenly, and, with a consequent jerk, the point of the instrument travels across the shallow cavity to impinge against, possibly to enter, the inner wall. Thus the facial nerve may be readily divided, but if it escape immediate division, effusion of blood into the tubular sheath of arachnoid which surrounds it may cause subsequent impairment of its function.

The signs of injury to the facial nerve—immediate or delayed—will be unmistakeable. The muscles of the corresponding side of the face being paralysed, the orbicularis palpebrarum will be unable to close the eyelids, whilst the orbicularis oris and the buccinator being rendered useless, the food will lodge in the pouch of the cheek, or, mixed with saliva, will trickle out of the mouth. (As the last-named muscle obtains additional motor filaments from the third division of the fifth nerve, its paralysis on divisions of the facial will only be partial.) The mouth, which was previously evenly balanced between antagonistic muscular forces, is now drawn over to the *unaffected* side.

Impairment of the sense of taste on the affected side is a remarkable feature of injury to the facial nerve, and is, in all probability, to be accounted for by the injury to the chorda tympani (a branch of the facial) having checked the vermicular movements of the lingualis of that side, so that the sensitive papillæ are no longer subjected to that frictional stimulus which is necessary to render a sapid substance perceptible. This lingualis muscle also exerts a special influence in the protrusion of the tongue by causing

a narrowing and consequent elongation of its own side of the organ. If the *right* chorda tympani is paralyzed that side of the tongue will remain short, soft, and flabby, so that on the patient endeavouring to put out his tongue (the right side being paralyzed whilst the left becomes stiff and elongated), the whole organ will be *pushed over to the right* (affected) *side.*

I agree with Allen when he says, "We must not attempt by the venturous operative surgery of laying open the tympanum to relieve the patient before we have exhausted every other possible means of treatment."* We can, I am certain, do an immense amount of good in long-standing cases of chronic aural catarrh by the use of the Eustachian catheter and the injection of carefully selected fluids into the tympanum, together with constitutional treatment suitable to the case.

In conclusion, to use the words of the author I have just mentioned, "whenever you see a patient dull of hearing, vacant in look, and only when he listens attentively capable of entering into conversation and distinguishing what is said (that is only when he exercises the stapedius muscle by an effort of the will), it may confidently be assumed that the accommodating power of the ear is defective or lost, in consequence of congestion and thickening of the lining membrane, plastic exudations, or adhesions in the cavity of the tympanum. The description of these symptoms and states of the middle ear, and of their liability to recurrence, will impress on the reader the necessity of preventing by timely treatment their becoming the source of permanent deafness."

* "On Aural Catarrh and Curable Deafness," p. 279.

Chapter V.

OTORRHŒA.

Purulent discharge from the ear is one of the most common symptoms of aural disease. It may arise from a variety of causes. For instance, the exanthemata (especially scarlet fever) produce that worst of all forms of diseases of the ear, viz., acute otitis, which may also take its origin from a blow on the side of the head, from colds arising from wet feet, sea-bathing, and so on. I have already given the symptoms and treatment of this malady in a less aggravated form, in the chapter on acute aural catarrh, so I shall not here go over the ground again. This acute form, however, very frequently (from the pent up matter bursting through the membrana tympani) leads to a chronic discharge, *i.e.*, otorrhœa. This chronic discharge, if not attended to, often further leads to very serious results, such as polypus of the ear, caries of the temporal bone, inflammation of the brain; or it may cause lobular pneumonia, with gangrene of the lung, from the lateral sinus or jugular vein becoming implicated. But a chronic discharge from the ear is by no means dependent on a previously acute form of the disease. In many cases—in strumous children, for instance—we never get any history of an acute attack. The discharge comes on gradually, without any pain, and although oftentimes disgustingly offensive, is allowed not unfrequently to

continue unchecked for months or years. No wonder, then, that it should occasionally be followed by some of the maladies I have just mentioned. It is therefore essential that proper means should be adopted, in order to get the ear into a healthy condition, and so to stop the discharge. This is to be brought about—

1st. By constitutional treatment.

2ndly. By thorough cleanliness.

3rdly. By astringent applications.

Constitutional treatment is of the utmost importance, and children suffering from this complaint, as a rule, require tonics. We can often cure a case of long standing otorrhœa, if, while we keep the ear thoroughly cleansed with a syringe and warm water, we simultaneously administer cod-liver oil and steel wine. The use of strong astringent lotions and thorough syringing will often fail to complete a cure unless we at the same time attend to the general health.

Astringent lotions prescribed for this disease should always be ordered to be used warm; the following is a case in point.

Master T., a little boy, aged five, was brought to me with a discharge from both ears, which had been constantly going on for 18 months. His mother said nothing seemed to do him any good. I prescribed cod-liver oil and steel wine, and a lotion of sulphate of zinc and carbolic acid, 5 grs. each to ℥i of water. The mother told me she had been using a very similar lotion for months without any effect. I asked her if she had applied it to the ears warm. She said no. I recommended her to do so, first

syringing out the ears very gently with warm water and then pouring in some of the lotion, made warm, at least four times a day. The discharge gradually stopped, and in a very short time the child was quite well.

The following notes, which I give as concisely as possible, show the length of time otorrhœa is sometimes allowed to run on unchecked, and the comparative ease with which it is diminished or stopped.

E. F., aged 10, having had a most offensive discharge from her ears for 3½ years after scarlet fever, came to the Hospital having slight pain at times. She was treated with tonics, with a zinc and carbolic acid lotion, and with strict cleanliness. In a month's time the discharge had stopped and she heard comparatively well, as very little mischief had taken place in the membrana tympani.

E. J., aged 13, who came to the Hospital the same day as the last patient, had scarlet fever 12 years ago and had been deaf ever since, with a constant offensive discharge from both ears. Had a perforation in the right membrana tympani, but not in the left. She got rapidly better under the same treatment, and the discharge, becoming gradually less offensive, at length stopped altogether. The perforated membrane did not much affect her hearing.

M. M. A., aged 16, came to me with deafness and otorrhœa of a year's standing. The discharge had come on suddenly, and she had been in bad health ever since. Her deafness was getting rapidly worse. She could not hear the watch in contact. I ordered a quinine and iron mixture and astringent lotions, which were changed from time to time. In two

months her hearing had almost returned, and the discharge had altogether ceased.

These cases are very commonly met with, but they often lead, as I have already stated, to much more serious results. We frequently find that the membrana tympani is perforated. The case very often begins with acute catarrh of the tympanum, the abscess bursts through the membrane and leaves, if unchecked, the chronic discharge. The treatment for perforation of the membrana tympani I shall leave for the next chapter.

Chapter VI.

PERFORATION OF THE MEMBRANA TYMPANI.

When we remember how extremely difficult it is to keep open a puncture artificially made by the surgeon in the membrana tympani, it ceases to be very remarkable that recent cases of perforation, whether from disease or accident, can be treated so successfully as they undoubtedly are if a little care be taken with them.

The treatment to be recommended for accidental injuries to the membrane due to the perforation of its structure by any sharp body (and this often is met with in hospital practice) has been already given at page 36. Very often, however, the wound heals up very quickly and little subsequent treatment is required. It is astonishing, considering the anatomical position of the parts and the close proximity of the brain, that more serious consequences do not often take place from these accidents.

George Bird, aged 54, a labourer, came to the hospital February 24th, 1874. Ten days previously he had fallen 8 feet from a ladder on to the side of his head. He had lost at least half a pint of blood from his left ear, was totally deaf on that side, and could not hear a watch in contact. He had been slightly deaf with the right ear since childhood. He said he constantly heard noises like water falling in

his left ear. Air could be distinctly heard passing through the membrane when he was told to hold his nose and blow. The rupture in the drum head could be seen very plainly. He had a constant and most offensive discharge. In this case I thought that, if I could get the mucous membrane of the tympanum into a healthy state and gradually stop the discharge, the large rent in the membrane would in all probability heal up; such eventually proved to be the case. I ordered the carbolic acid and sulphate of zinc lotion, and the ear to be very constantly washed out and kept thoroughly clean. On February 27th the discharge still continued, but was much less, and had altogether lost the disagreeable smell; the lotion was increased in strength, and he was ordered a mixture of iodide of potassium and cinchona. On March 13th the discharge had quite stopped, the membrane had healed up, and he could hear the watch perfectly in the ordinary way.

James Hooker, aged 28, came to the hospital March 27th and was admitted into the accident ward. Says that a week previously he was running up stairs, when he suddenly fell, his head coming in contact with an iron rail; he was insensible for a few hours afterwards. He lost a considerable quantity of blood from his left ear. Complained of great noise on that side of the head. The membrana tympani was ruptured and a thick offensive discharge came away. At times he was very giddy. He was treated very much the same as the last case. In a week's time the discharge had stopped; the membrane had healed up, and his hearing returned as perfect as it was before the accident.

Frederick Lee, aged 29, a painter, was admitted into the aeeident ward with a fracture of the temporal bone, of the right side, and a rupture of both tympanie membranes from a fall on his head. He was brought into the hospital uneonscious, with hæmorrhage from both ears.

Three days after admission he became sensible, but was totally deaf. He eould not hear the sound even of a tuning-fork plaeed on the vertex. I saw him, with my colleague, the late Mr. Gascoyne. It was rather a complicated case, but we thought it probable that he had effusion of blood in the inner ear. He was blistered over the mastoid process, and took iodide of potassium for some considerable time. Both membranes healed up in a week's time, and he very gradually got back a fair amount of hearing. He remained in the hospital two months, and went out in good health.

In perforations of long standing, when there is also deafness present, I have seen very good results obtained from thoroughly washing out the tympanum with eertain fluids. The membrana tympani is thickened, that is to say, the mucous membrane covering its inner surface and investing the ossieula is swollen from constant suppuration going on in the tympanum, or it may be that a eollection of hardened mucus has glued together those structures so important to the proper pereeption of sound in the auditory apparatus. Should such be the case, then I maintain that if, by any means, we can lessen this thickening, by getting the mueous membrane into a healthy state, or by getting rid of hardened mueus and restoring the structure as nearly as possible to

its natural state, an immense advantage will often be gained, for in many cases the deafness is not dependent on the perforation, but on this thickening of the membrane. The following case is an example :—

I was called to see a lady in Grosvenor-square, in consultation with Dr. Cheadle. She had been deaf in the right ear for four years after measles. Could not hear my watch in contact. The membrana tympani was perforated and thickened—perforation about the size of a pin's head. I suggested that she should draw up through her nose a warm solution of bicarbonate of soda twice a day, and by this means thoroughly wash out the tympanum through the right Eustachian tube. A strong solution of nitrate of silver was also subsequently applied twice a week to the orifice in the membrane by means of a camel's hair brush, or by a probe and cotton wool. The Politzer air-bag was also used occasionally, and a sulphate of zinc lotion was ordered to be poured into the ear daily, in the manner I have before suggested in page 36. The patient's hearing steadily improved, for when I first saw her, she was not able to hear my watch in contact, but by this treatment she, inch by inch, gained two feet of auscultatory distance—a vast difference to a deaf person!

Another similar case was that of a gentleman, A. H. S., Esq., sent to consult me by Dr. Sieveking, 3rd April, 1876. Had been deaf seven years after scarlet fever, and when he came to see me, he was getting rapidly worse. He had a small round perforation in both tympanic membranes. Could hear a watch ten inches from the right ear, two inches

from the left. Had an offensive discharge occasionally from both ears.

By the same treatment adopted in the last case, he very shortly got better, and on April 29th could hear the watch at a yard's distance from either ear.

It is of the utmost importance in these cases of perforation to get the mucous membrane of the tympanum into a healthy condition, and this is best brought about by attacking it from within through the Eustachian tube in the way I have just shown, and externally through the perforation by means of warm astringent applications and the Valsalva method of inflation. For we are able by these means not only to get the mucous membrane into a healthy condition, but also to wash away any abnormal discharges or inspissated secretions that may be clogging up the fenestræ and so preventing the entrance of sound into the labyrinth. It is not only the mucous membrane covering the fenestral openings, but also the proper function of the ossicles, that are in the same manner interfered with. Perforations of the membrana tympani, however, vary very much in the size, position, and shape, and in the effect they produce in the passage of sound. Two patients may have precisely the same kind of perforation arising from the same cause and looking as alike as possible, yet their hearing may be very different. The late Sir William Wilde was of opinion that, "when once the tympanal membrane has become permanently open, the larger the aperture, the greater the amount of hearing, provided no further mischief has taken place, and that there is a slight ring or circle of the membrane still remaining."

Again, the amount of hearing power remaining after the membrane is perforated, will be dependent in a great measure on the position of the aperture and on the question whether any of the ossieulæ have been injured or lost.

The incus, according to Allen, most frequently comes away, as it is less firmly fixed than the other bones, and he says "it is important to note that this solution of continuity, especially in the articulation between the stapes and incus, may take place in the purulent inflammatory process, without necessarily any rupture of the membrana tympani: and it is in such instances as these that a most surprising improvement in hearing follows when Yearsley's artificial tympanum is applied to the membrane; the incus being thus pressed against the stapes, and the continuity of the chain restored."

We occasionally find more than one perforation in the membrana tympani, but the largest we meet with are as, a rule, the result of scarlet fever. Toynbee ("Diseases of the Ear," page 166) gives an excellent description of these injuries. He says:—

"In cases of general ulceration of the mucous membrane of the tympanum, the incus is commonly discharged, and sometimes the malleus also; but even in these cases, if the attachments of the stapes to the circumference of the fenestra ovalis remain uninjured the power of hearing may be greatly improved; should the stapes, however, be removed, total and irremediable deafness ensues. In the management of cases of perforation, we can often improve the hearing in a very satisfactory degree by treating them in the manner I have stated, viz.,

getting the mucous membrane into a healthy condition, and removing abnormal secretions which may be causing obstruction to the passage of sound."

In other cases better results may be gained by the introduction of an artificial membrana tympani. It is impossible to tell beforehand, however, whether these instruments will be of any service. Some patients derive the greatest benefit from wearing them, while others do not seem to gain any advantage. In the "British Medical Journal," June 19th, 1875, I published a paper on this subject, which I now give.

"On a New Form of Artificial Membrana Tympani.

"In treating cases of perforation of the membrana tympani, it has always appeared remarkable that some patients should derive benefit from Yearsley's pellet of moistened cotton-wool, while others gain greater advantage from Toynbee's artificial membrane. It has, therefore, occurred to me that the instrument I am about to describe might prove advantageous; and such I have found to be the case. It is simply a combination of Toynbee's artificial membrane, viz., a thin disc of india-rubber mounted on a fine silver-wire stem, with Yearsley's cotton-wool. In my instrument, the wire is carried beyond the India-rubber for about a quarter of an inch, and terminates in a second disc, made of flannel. The space between the two is filled up with a small portion of Dr. von Bruns's wound-dressing cotton-wool, which is absorbent, and so takes up and communi-

cates to the flannel disc any medicated solution which it may be desirable to apply. To prevent overcharging the cotton-wool, a pipette should be used, as one or two drops are sufficient to moisten every fibre of the wool and flannel.*

"Its advantages are the following:—

"1. It does not irritate the membrane, and being very soft, is not likely to injure it.

"2. It is made of cotton-wool, which is absorbent; lotions can by its aid be constantly applied with much advantage.

"3. By thus keeping the part clean, the membrane gets into a healthy state, and the perforation heals.

"4. The hearing distance is improved.

"5. It is not liable to leave the India-rubber disc in the meatus.

"6. It is easily used; and does not require the forceps, as Yearsley's cotton-wool does.

"The following cases are interesting:—

"E. F., aged 26, a clerk, came to consult me at St. Mary's Hospital, having suffered from deafness for twenty years. Both membranes were perforated. On the right side there was a large perforation; he could not hear my watch in contact. On the left side there was a smaller perforation and he heard the watch at the distance of an inch. On the right side Toynbee's membrane increased his hearing about seven inches; cotton-wool had no effect. In the left ear Yearsley's mode of applying cotton-wool answered best; the india-rubber disc having very little effect on this side. With my instrument,

* It is made by Messrs. Krohne and Sesemann of Duke Street.

he could in time hear nearly eighteen inches on each side. His hearing therefore was greatly improved, the membranes gradually getting into a healthy state. He said 'I can now hear sermons,' a benefit he had never previously been able to enjoy.

"H. J., aged 19, came to consult me at St. Mary's Hospital. She had been deaf for two years in both ears. The deafness came on after measles. She had a large perforation of the membrana tympani on the right side, with constant offensive discharge. She could not hear a watch in contact. After the new artificial membrana tympani was used, her hearing improved one foot, and by using (with its help) various lotions applied directly to the perforation, the discharge gradually ceased, and her hearing distance when wearing the instrument became quite one yard, against about four inches without it, the membrane looking healthy, and the perforation being decidedly smaller.

"W. D., had perforation of the left membrana tympani. He could not hear a watch in contact. He had been deaf eight months; the deafness came on after 'brain-fever.' This boy's hearing improved four inches, and the discharge, which had previously been very great, ceased altogether.

"H. L., aged 17, had had deafness for five years in both ears after scarlet fever. There were large perforations in both membranes. With Toynbee's artificial membrane, her hearing greatly improved, say four to five inches. The application of the cotton-wool also afforded benefit; but, with the combination of the two, a still better result was obtained; for, when she wore it in her ears, she could hear ordi-

nary eonversation perfectly well, and the hearing distanees were twelve and fifteen inehes. The lotion she latterly used (whieh quite stopped the discharge) consisted of two grains of the nitrate of silver to the ounee of water.

"S. M., aged 26, had perforation of both membranes, much the same as the last ease. It eame on from searlet fever. Her hearing was improved to a very great extent on both sides. She said that my instrument was mueh more eomfortable than the other, and did not move about like the india-rubber one; she also heard double the distanee with it. The discharge stopped.

"I have had several other cases of the same kind, both in hospital and private praetice, in all of whieh the benefit has been the same.

"Dr. Peter Allen* was of opinion that 'in Yearsley's eontrivance (when the natural membrane is perforated or lost) the benefit is derived from support given to the ossieula, by whieh they are enabled to exercise that due pressure at the fenestra ovalis, whieh keeps the membrane of the fenestra rotunda in a condition susceptible of vibration, and eapable of transmitting them to the nerve-expansion of the labyrinth.' And Yearsley himself says his objeet is to support the remaining portion of the membrana tympani or the ossicula, and that care must be taken that the entire opening be not eovered, otherwise the experiment will not suceeed; it is also indispensable to sueeess, that the moisture of the wool should be preserved.†"

* "On Aural Catarrh," p. 371.

† "The Lancet," July 1, 1848.

"Toynbee, on the other hand, says, 'It seems to me doubtless that one of the functions of the membrana tympani is to confine the sonorous undulations to the tympanic cavity, in order that they may be concentrated on the membrana fenestræ rotundæ. Indeed, it is probable that the vibrations only partially pass through the chain of bones to the vestibule, and that the air in the tympanic cavity is one great medium of communication with the labyrinth. If the means of communication with the labyrinth be the air in the tympanic cavity, it is palpable that any aperture in the membrana tympani is likely to diminish the power of hearing, by permitting the vibrations to escape from that cavity into the meatus, and so preventing their concentration upon the membrana fenestræ rotundæ.'*

"But, in the supplement of the last-cited work,† Hinton says, 'Mr. Toynbee also modified the view he at first entertained.‡ This he was partly led to do by intercourse with Dr. Julius Erhard, who, without any perforation, found his hearing much improved by the use of cotton-wool, and published his experience in a paper entitled, 'Deafness Curable by Pressure.'

"Roosa says 'That the artificial membrane is only of service in cases of partial or complete loss of the drum head.'§

"Von Tröltsch quotes Politzer that the action upon which the benefit mainly depends is the pressure on

* "Diseases of the Ear," p. 160.

† "Diseases of the Ear," p. 452.

‡ "Diseases of the Ear," by Dr. von Tröltsch, translated by James Hinton, M.R.C.S.

§ "Treatise on Diseases of the Ear," p. 380.

the remaining portion of the membrana tympani and the chain of ossicula; whether it be that by this mechanical influence a morbid relaxation in the connection of the ossicula is removed, or the fluid in the labyrinth is put under increased pressure. Such an India-rubber disc will act as a vibrating plate, and can transmit a considerable number of vibrations to one of the ossicula.

"This appears to me to be the best explanation. I use the cotton-wool for the necessary pressure on the remaining portion of the membrana tympani, and, at the same time, the India-rubber disc as a vibrating plate.

"The improvement I suggest I have found of great service in nearly all cases of perforation. The instrument should not be worn at first for more than an hour at a time, the cotton-wool should be often changed, and the lotions altered occasionally; and, lastly, it is very essential that only a very small quantity of fluid should be applied to the cotton-wool."

Chapter VII.

ON SOME OF THE MORE SERIOUS CASES RESULTING FROM OTORRHŒA.

As I have before pointed out, very serious results sometimes occur from allowing a chronic discharge from the ear to go on unchecked, as ABSCESS OF THE BRAIN may be so produced.

The following interesting case was admitted under the care of Dr. Handfield Jones, to whom I am indebted for his notes of it while in hospital. The remarks on the *post-mortem* examination, &c., are my own.*

Charles Talbot, aged 20, groom, was admitted July 13th, 1874. His health had been generally good, except that he had been deaf in the left ear since he was six years old. Some discharge occurred occasionally. He was taken ill thirteen days ago with pain in the left side of the head from the mastoid region to the temple. He became unconscious and delirious on the morning of admission. The pain had been very severe, and discharge had occurred from the ear. When admitted, he was in a state of morose stupor, lying on the left side, refusing to move, and struggled violently when he was raised up to have his ear examined. The skin at the mastoid region was perforated by several small openings, and pus had escaped from them. A free incision was made

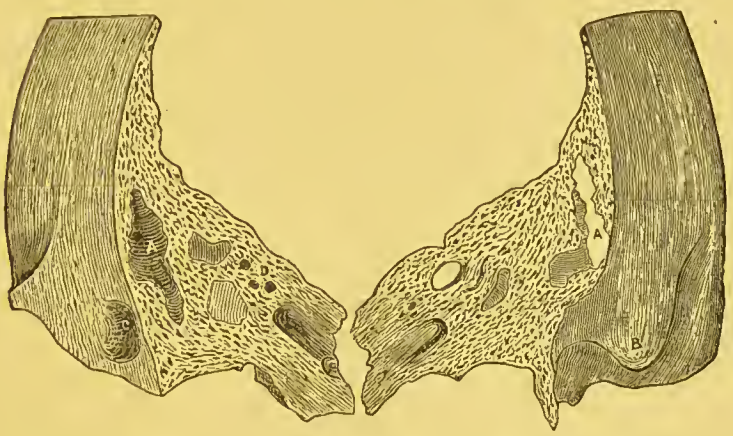
* "British Med. Journal," Dec. 19th, 1874.

in this part, which was distinctly tender; and a drachm of compound jalap powder was ordered, which acted well. He was ordered also four grains of iodide of potassium four times a day. On the 14th, he seemed better; he was more conscious, and showed his tongue a little when asked. The urine had a specific gravity of 1030, and contained a notable amount of albumen, and also of sugar, the albumen having been separated first. Pulse 87; temperature 102·2. On the 16th, he was more sensible, but very dull and listless in manner; and he had no pain. Pulse 76. There was a copious eruption of herpes round the mouth. At 2 P.M., he said he had pain in the head and felt no better. There was purulent discharge from the meatus and in the wound behind the ear; no dead bone was felt. On the 17th, he was very much better, was quiet at night, and fed himself during the day. He slept very well. Temperature 98·7; pulse 72. He answered questions very slowly. When pressed to say where he had pain, he put his hand to his forehead. He had, since the 16th, a lotion of 6 grains of sulphate of zinc, 2 grains of carbolic acid, and 15 minims of liquor morphiæ, in 1½ ounces of water, as an injection into the ear. A pint-and-a-half of urine was drawn off by the catheter on the 16th. The compound jalap powder was repeated. On the 20th, he was much better. He was much more conscious, heard a watch with the right ear, but not with the left even when touching the ear. Temperature 98·24; pulse 80. On the 23rd, he was doing fairly well. There was free purulent discharge from the wound behind the left ear. Temperature 99; pulse 86. The mastoid region was tender. He was more

lively this morning, and much less deaf. The bowels were open. On the 27th, he felt, he said, very much better. There was a very copious discharge oozing from small openings, very offensive. There were sinuses leading for four or five inches downwards and backwards, but no dead bone could be felt. He was ordered to have three times a day 4 grains of iodide of potassium with a drachm of tincture of cinchona in an ounce of decoction of cinchona. He took nourishment well. On the 29th, he uttered a single shriek every hour or so. After this, he did not improve. The pain in the head became more severe; he lapsed into a stupid condition, finally becoming comatose; and died on August 4th.

Post Mortem Examination.—Behind the left ear, the skin was dusky and infiltrated; and pus was escaping through an opening which had been made some days previously by the house-surgeon. A probe introduced showed the mastoid process to be denuded of periosteum, and roughened. On opening the skull, matter escaped which had been collecting in the form of a large abscess above the dura mater in the right parietal region. The pus, which was very offensive, somewhat resembled in colour beef-tea. On removing the dura mater, which was red and thickened, the right hemisphere exhibited evident signs of compression from the pent-up pus. The dura mater had been extensively separated from the skull from the left mastoid region to the seat of the great collection. This condition had, in all probability, resulted from the patient lying on the non-affected side of the head for a few days before death, the pus thus gravitating as he lay. On removing the

eneephalon, the left lobe of the eerebellum was found to be eompletely disorganised, and in direet communieation with the primary abseess, situated in the eells of the left mastoid proeess. The dura mater itself was diffluent in that region. On making a seetion of



AA. Cavity formed by the abscess. On the right side of the drawing this cavity has, to a certain extent, penetrated the bone and entered the cranium. The section has been made exactly through the centre of the pyrogenic cavity. B. The mastoid process. C. Meatus auditorius externus. D. Semicircular canal, though the edges of which the section runs.

the temporal bone, the mastoid proeess showed itself to be the birthplaee of an extensive eolleetion of pus, which had made its way through the thin wall of the groove of the lateral sinus, without opening into the venous channel itself. The thoraeie and abdominal viseera were healthy.

Remarks.—About a third of the eases of eerebral abseess arise from ehronie suppurative proeesses in the middle ear.* Although the lateral sinus itself re-

* Reynold's "System of Medicine," vol. 2, p. 544.

mained uninjured, this case points out clearly how easily inflammation extends to that sinus and to the jugular vein, accounting for the numerous cases that die from lobular pneumonia with gangrene of the lung, in eonsequence of chronie disease of the ear of the same side (Sir W. Gull, Cases of Phlebitis with Pneumonia and Pleurisy, from Chronic Disease of the Ear.* Also, as Toynbee first pointed out, "affections of the external meatus and mastoid cells produee disease in the lateral sinus and cerebellum;" and, lastly, to use the words of the same author, "the insidious progress of eases in which matter in the cavities of the ear injures the petrous bone and the brain, cannot be too often or too forcibly impressed upon the mind of the profession."†

The next case has very much of the same character, and, in all probability, would have ended in like manner, had not a deep incision down to the bone over the mastoid process stopped further mischief.

M. C., aged 25, a housemaid, was admitted into the hospital, under the care of Dr. Broadbent, June 9th. Said that she began to look pale 12 months sinee, though she felt well up to Christmas, when she began to feel weak. About a fortnight since, she was sick all day, whether she took food or not. The colour of the vomit was yellowish-green, about three pints during the 24 hours. Felt very weak with swimming pains in the head; everything seemed to go round; she eould not see elearly, and had a "running" from the left ear. Said "the beat of the heart ran up to the top of her head on that side." Her

* "Association Medical Journal," April 13th, 1855.

† "Med. Times and Gazette," March 16, 1861.

pulse was 72. Temp. 98·8. Had a lisp and slight difficulty in commencing to speak. The apex beat could scarcely be perceived.

On the 12th she complained of great pain in her mastoid process, and could not hear at all with her left ear.

15th. Did not feel so well. Was sick; said she felt sick and giddy. Complained of pain an inch below and to the left of the apex of the ensiform cartilage. The chest was sore and painful on percussion; the breathing and inspiration short, rather sudden over front of left lung.

18th. There was still discharge from ear. Temperature, 99·2°.

19th. Dr. Broadbent asked me to see her. She complained of great pain over the whole of the left side of the head; she was unable to lie on that side. Said that when she put the left side of her head on the pillow, the "pains darted through her brain." She looked very flushed, and the discharge had nearly stopped from her ear. The skin over the left mastoid process looked red and swollen. She was unable to hear the slightest sound with the left ear. Said she "felt dizzy, and the patients in the ward looked quite small." I determined at once to make a deep incision on the mastoid process, to try and let out the pent-up pus. I accordingly carefully cut down to the bone. A large quantity of yellowish, creamy-looking and very offensive matter escaped through the opening, and also through the external auditory meatus. I kept the wound open by means of a small piece of lint, as long as the discharge lasted (about six days). The ear was syringed with warm

water very frequently, and a lotion of sulphate of zinc and carbolic acid (gr. v. of each to ʒi of water, warm), was ordered to be poured into the ear three times a day, after it had been so syringed, the patient at the same time being directed to "hold her nose and blow." By this means, and also by drawing up weak lotions through the nose, the parts were kept constantly clean, and the discharge gradually ceased. By using the Politzer air bag occasionally, the Eustachian tube was kept open. The wound closed, and on July 13 she did not feel the slightest pain in the mastoid process, the perforation in the membrana tympani had closed, and she heard very well again with the left ear.

Abscess in the brain (probably in the cerebellum, as in last case), would no doubt have resulted if the opening had not been made. If the lateral sinus had been implicated (and the words she made use of, viz., "the beat of my heart runs up to the top of my head, on the left side" were, I think, significant), the case would probably have terminated in lobular pneumonia, with gangrene of the left lung.

A very similar case was sent up to me a short time ago, from the Isle of Wight, when the wound remained open for several months, and small pieces of dead bone gradually came away, until at length the opening I had made healed.

These cases are not at all uncommon, and show us very clearly how necessary it is that early and proper treatment should be adopted in dealing with otorrhœa. As I have before remarked, the public generally suppose that the disease will cure itself, or in other words, "that the patient will grow out of it." Expe-

rience teaches us that this is not the case, and, moreover, that a discharge from the ear, allowed to take its own course, will in all probability lead to much more serious consequences, generally to some considerable impairment of hearing, and occasionally even to loss of life.

I will here introduce some notes on cases of AURAL POLYPUS, which I furnished to the "Lancet," in the month of April, 1876.

CASE 1.—A girl, A. M., aged 26, was brought to me at the hospital, with most extensive disease of the mastoid cells. She had had a polypus removed somewhere in the country, about a year previously; no after-treatment had been adopted, and the discharge was allowed to continue until the inflammation thus set up extended to the brain, and she nearly lost her life in consequence. A free incision over the mastoid process down to the bone considerably relieved her, and by careful treatment for six months, by astringent lotions, and by keeping the parts constantly clean, she entirely lost the discharge, and regained a very fair amount of hearing power. This case shows what mischief may result from neglecting proper treatment after the polypus has been removed.

CASE 2.—A lady was sent to consult me by Mr. Milson, in June, 1874. The right membrana tympani was perforated, and a small red polypus could easily be distinguished making its way through that structure. She had suffered from an offensive discharge from that ear for eight weeks, with slight pain and tinnitus aurium. The ear was syringed frequently with warm water, and afterwards a warm

solution of carbolic acid and sulphate of zinc; five grains of each to one ounce was ordered to be poured into the ear, and allowed to remain for some time. The polypus was painted every morning with a solution of nitrate of silver, 20 grains to the ounce. After a very short time the discharge and the polypus disappeared, the membrane healed up, and the patient regained her hearing.

This case shows very well how smaller growths may be made to disappear by the constant application of caustics. Strong solution of sulphate of zinc answers very well in some of the softer kinds of polypus; or a combination of the two remedies, as used in this case, is perhaps the best treatment.

Case 3.—E. W., aged 42, came to see me at the hospital, with a large polypus completely blocking up the left external meatus. Said that she has been deaf for three or four months, and had had slight noises in the head, but no pain. There was a great deal of very offensive discharge, which came away at times. The growth, which seemed to be a very large one, I removed. Very slight hæmorrhage followed, and she was completely cured by using the sulphate of zinc and carbolic acid lotion, as in the last case.

Case 4.—A. L., aged 16, came to the hospital December 6th, with a large polypus in the right ear. It was easily removed, but left a large perforation in the membrana tympani. She attended regularly for two months. The discharge continued for some time. All kinds of lotion were used; the acetate of lead two grains to the ounce, proved of most service. At length the discharge ceased, the perforation

became much smaller, and she left the hospital hearing perfectly well.

CASE 5.—This was a young man sent to see me by Mr. Ransford. Much the same kind of polypus as in last case; a very large one. The hæmorrhage after the operation was severe, but was checked after a little time by syringing cold water gently into the ear. The perforation in the membrane healed up remarkably soon. In ten days' time he was quite well. The carbolic acid and sulphate of zinc lotion was used diligently in this case.

CASE 6.—J. M., aged 32, a school teacher, came to the hospital with a large polypus in each ear. They were both successfully removed with Wilde's snare. A great quantity of discharge came away afterwards, which readily yielded to the frequent application of astringent lotions. She was going on very satisfactorily when she left the hospital.

Case 7.—A. B., aged 17, came up from Windsor to consult me at the hospital, March 15th, with a very large polypus in the left ear. Had been getting gradually deaf for six years, and had had during that time a constant discharge of an offensive character. I removed the growth in the usual way with Sir W. Wilde's snare. The illustration gives the exact size of the polypus, the largest I have seen. She was very sick after the operation, but subsequently did remarkably well, the discharge entirely ceased, and in a month's time she went home with her hearing restored. The pedicle represented in the wood-cut shows the size

of the perforation in the membrana tympani, through which the polypus passed.

I could give a great many instances of the same kind; but what I want especially to point out is, that a successful termination to these cases is not to be expected unless a careful treatment is adopted after the removal of the polypus. If the discharge is allowed to go on unchecked after the operation, the disease will in all probability shortly return. Polypi are frequently removed, and no steps are taken to get rid of the accumulated secretion in the tympanitic cavity, and, therefore, in a short time another polypus is likely to spring up again. Thorough cleanliness is most essential. Hinton remarks:*— "Growths of this nature in the ear are extremely prone to recur, but the degree of obstinacy with which they resist treatment is very variable. In some rare cases they will come away spontaneously and leave a permanently healthy surface; in others they will disappear before treatment, and show no tendency to recur; in others their eradication is attended with the utmost difficulty. It has seemed to me that the accumulation of secretion behind the polypus or its root is one of the most frequent sources of difficulty in their treatment, especially in cases where the membrana tympani is perforated. The viscid matter poured out by the spongy mucous membrane of the tympanum tends to cling about its various crevices and maintain a perpetual irritation, which sets every kind of caustic or healing application at defiance. Accordingly a chief object to be aimed at in the management of polypi is the perfect cleansing

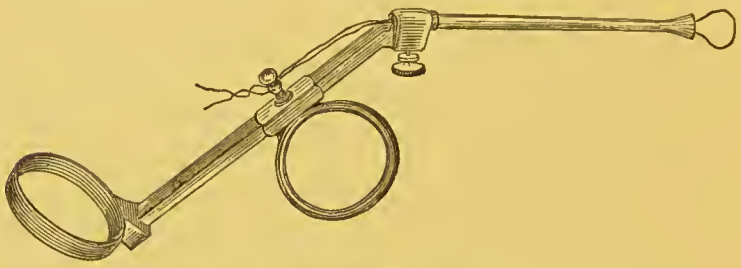
* "Supplement to Toynbee's Diseases of the Ear," p. 432.

of the deep-seated parts of the organ. This is not to be effected by syringing merely, however vigorous and long-continued. Water does not remove the tenacious matter, nor, probably, does the stream reach the whole secreting surface."

I have found, almost invariably, that aural polypi arise from the mucous membrane of the tympanum, and not from the walls of the external meatus, but they occasionally take their origin from the membrana tympani, and sometimes from the Eustachian tube. They are, as a rule, the result of long-standing otorrhœa, and the polypus makes its way out through a perforation in the membrana tympani. They vary considerably in structure, size, &c. According to Stendener, the polypi which occur most frequently in the ear are mucous, the firm fibromata are less common, and the gelatinous myxomata the rarest. All kinds of methods have been proposed for their removal. Toynbee and Allen each invented an instrument—the former the lever ring for-

TOYNBEE'S LEVER RING FORCEPS.

ceps, and the latter a slender three-bladed pair of forceps. Dr. Purves has also introduced an excellent instrument for cutting through the growth. I always



WILDE'S POLYPUS SNARE.

use Wilde's snare, and prefer it to everything else that has been suggested.

The illustration shows the microscopical appearance of the most common kind of aural polypus. I

am indebted to my colleague, Dr. Shepherd, for the following notes:—"On section the growth showed the usual fibro-cellular structure of these polypi—round, oval, and stellate cells imbedded in a delicate reticulum of fibres. In some places the latter were almost absent; in others, and apparently in the neighbourhood of a collection of blood-vessels, the stroma was more distinctly fibrillated. The blood-vessels themselves, as shown in transverse and longitudinal section, were pretty numerous."

Chapter VIII.

TINNITUS AURIUM.

Singing in the ears* is very frequently met with, is common to nearly all aural diseases, and is often a symptom of a most distressing kind.

I can imagine nothing more painful, nothing harder to bear, than such a continual noise in the ears, as some unfortunate patients describe. The shriek of a railway whistle is never a particularly delightful sound, but to be obliged always to listen to it, whether we like it or not, must surely be horrible in the extreme.

Here I will introduce a few extracts from the writings of others on this important subject.

Roosa† mentions a case of a professor who consulted him on account of severe tinnitus aurium, and finding that he could get no relief, said, on leaving the consulting-room, that he would put an end to his existence, which he did shortly afterwards by blowing out his brains.

Another instance is recorded, viz., of a public school teacher who was so exceedingly depressed from the same cause, that he committed suicide.

Kramer says, also, "I have known an instance of a man, once strong and healthy, who committed

* From a paper read by the author before the Harveian Society, April 15th, 1875.

† "Diseases of the Ear," p. 265.

suicide to escape from a persistent and loud noise in the ears, which had lasted for many years."*

Sauvage records an instance in which a musician was compelled to give up his occupation because he continually heard a second note inharmonious with every one he played.† A very similar case—a lady sent to consult me by Dr. Meadows—has come under my own observation.

And now as to the cause; Sir William Wilde says:—"The peculiar character of the tinnitus and the noises to which it is likened, are as variable as sound itself; I think the descriptions which patients give of the noise which they experience depend, to a certain degree, upon their fancy, their graphic powers of explanation, and, not unfrequently, upon their rank in life, upon the position in which they have been placed, or the sounds with which they are most familiar; thus persons from the country draw their similitudes from the objects and noises by which they have been surrounded, as the falling and rushing of water, the singing of birds, buzzing of bees, and the waving or rustling of trees; while, on the other hand, persons living in towns, or in the vicinity of machinery or manufactures, say that they hear the rolling of carriages, hammering, and the various noises caused by steam-engines. Servants almost invariably add to their other complaints that they suffer from the 'ringing of bells' in their ears. The tidal sound, or that which we can produce by holding a shell to the ear, is, however, most frequently com-

* "The Aural Surgery of the Present Day," by Dr. W. Kramer translated by H. Power, Esq., F.R.C.L., p. 19.

† Holmes's "System of Surgery," vol. 3, p. 185.

plained of. Removing the cause and curing the deafness will often, but not always, relieve the patient of the noise. It is often caused by cerebral disease: it is sometimes an accompaniment of derangement of the circulatory, digestive, or uterine organs; of congestion of the brain, hæmorrhage, hypochondria, hysteria, chlorosis, anæmia, typhus, influenza, or simple catarrh; of closure of the external meatus, obstruction of the Eustachian tube, and impaction of the auditory passage with wax. A foreign body, or even a hair resting on the tympanic membrane; as well as engorgement of the lining membrane, or mucous collections in the tympanic cavity; and also nervous deafness: these will all produce it. So great is the discomfort which it gives, that persons incurably deaf, and who are quite conscious of the impossibility of restoring their hearing, will still apply to be relieved from this haunting and most annoying symptom. Overwork, prolonged suckling, taking quinine or iron in large quantities, a hearty meal, violent exercise, &c., &c., will often occasion it."

Galen thought that tinnitus aurium was due, in some cases, to exhalations from the stomach, and in others to increased sensitiveness of the ears.

The late Dr. Peter Allen wrote:*—"As chronic catarrh is the commonest form of deafness, so is tinnitus aurium the most frequent result or sign of it. It is dependent upon some abnormal pressure upon the nervous expansion in the labyrinth. The membrana tympani presses the ossicula inwards, and therefore the base of the stapes upon the fluid where the auditory nerve is distributed; or it may be so

* "On Aural Surgery," p. 84. "On Aural Catarrh," p. 240.

rigid, tense, and unyielding, that the secretions within the drum press unduly upon the still more delicate membrane of the fenestra rotunda. Thickening and great tension of the lining tympanic membrane do the same thing. When, in a case of aural catarrh, tinnitus and deafness are simultaneous in their commencement, they will increase proportionately; and it is obvious that in this instance both must depend upon some alteration in the conducting apparatus, by which its *acoustic* properties have been interfered with. For example, a little film of mucus spread over the inner side of the membrana tympani, is sufficient to alter the periodicity of its atmospheric vibrations, or even partially to quench them. Thus deafness and tinnitus will co-exist here; but as soon as the removal or dispersion of the coating from the membrana tympani occurs, both symptoms will together instantaneously vanish. We are amply warranted by facts like these in concluding that the membrana tympani is generally, in some way or another, concerned in causing tinnitus."

"Next in frequency to interference with the membrana tympani, closure of the Eustachian tube is the most common cause of singing in the ears. This also, on analysis, proves to be such, not directly, but in the following manner:—A closed tube necessitates a too great curvature inwards of the membrana tympani, and consequently an abnormal pressure upon the nervous expansion within the labyrinth." And this is a most important point to observe.

Hinton, also, in his supplement to Toynbee's work makes the following remarks:*—"When of a beating

* P. 462.

character and synchronous with the pulse, it is obviously referable to vascular conditions as its exciting cause, and among others sometimes to aneurism of the basilar artery. In some cases, pressure over the course of the carotids immediately beneath the ear temporarily arrests it. In any such case, regard, of course, should be had to the condition of the heart. Some cases, when connected with headache, are said to be dependent on a weakened right side of the heart. Perhaps, however, the most frequent cause of tinnitus is pressure on the labyrinth, as illustrated by the sound heard on pressing on the membrana tympani with a probe. But in estimating the causes of tinnitus it appears to me that the great frequency with which enlargement and fulness of the blood vessels of the labyrinth are found, on dissection, to accompany even slight inflammatory affections of the tympanum, should not be overlooked, and that it may be held probable that any considerable amount of tinnitus seldom exists without somewhat of morbidly increased irritability of the auditory nerve."

In a great many dissections made by Toynbee, Politzer, and others, this diseased condition of the labyrinth has been found; but on the other hand, a case is related by Mr. Dalby,* of a man residing at Trieste, "who had suffered for many years from tinnitus of so distressing a character that his life was rendered perfectly wretched. All the best aural surgeons in Germany had been consulted by him without any benefit. According to a request made in his will that his ears should be examined after

* "Lectures on Diseases and Injuries of the Ear," by W. B. Dalby, F.R.C.S., p. 175.

death, a most careful dissection was made of the temporal bones, but no abnormal appearance of any kind was detected."

We rarely find tinnitus present in cases of perforation from ulceration, and incising the membrane, no doubt, will afford relief, if a permanent opening can be established; but here everything depends on that little word "if." All kinds of methods have been suggested to keep open the puncture; but there is always the utmost difficulty, and oftentimes danger in operating.

Various other remedies have been proposed for this distressing symptom of aural disease. The hydrochlorate of ammonia, 20 grains, three times a day, is said to be efficacious sometimes; also glycerine and laudanum, applied warm to the meatus. I have used both these remedies frequently, but have not succeeded in giving relief.

An eminent writer in the "Medical Times and Gazette," * says :—"In some cases rubbing over the membrana tympani gently for a short time with a camel's hair pencil, moistened with any mild ointment, will—for a while, at least—remove the noise." And again, he says: "If there is any medicine which acts specifically on tinnitus aurium it is arnica." Well, I have dosed many patients with arnica without any good result.

Triquet reports cases cured in a few days by daily injections of the vapour of chloroform into the tympanum.†

Kramer, again, affirms that tinnitus is in all cases

* Sir W. Wilde.

† Holmes' "System of Surgery," vol. 3, p. 185.

due to irritation of the chorda tympani, and not of the acoustic nerve; and says that the repeated injection through the Eustachian catheter of a drop or two of a solution of strychnine—one grain to the ounce of water—will generally cure it.

In Holmes' "System of Surgery," the author of the paper on the Ear says:—"Of all medicines, a combination of quinine and morphia in small doses, taken perseveringly once or twice a-day, seems the most useful. Stimulating liniments around the ears, perhaps containing chloroform, if tinnitus is a prominent symptom, are at least unobjectionable; and the free use of cold water and friction may in most cases be advised. I have never known any benefit produced by strychnia."*

Bromide of ammonium, ergot, digitalis, bromide of potassium (which I have found useful in several cases) have all been recommended: so have other more extraordinary remedies. A patient of mine at St. Mary's believed "a bit of dead eel put in the ear," to be "a capital thing for the buzzing noise."

Dr. Laurence Turnbull, of Philadelphia, very kindly sent me his pamphlet on Tinnitus Aurium (reprinted from the "Philadelphia Times," June, 1874), in which there is very valuable information on the subject; but unfortunately it arrived after I had read my paper at the Harveian Society.

He gives the diagnosis and causes, I think, so clearly that I cannot do better than quote from his instructive pages.†

* The author has sometimes considerably lessened tinnitus in some forms of nerve-deafness by the administration of a mixture containing quinine, morphia, and strychnia.

† "Tinnitus Aurium, or Noises in the Ears," by Laurence Turn-

THE DIAGNOSIS AND CAUSES OF TINNITUS AURIUM.

"The first and most frequent cause we shall notice is the pressing of a portion of altered cerumen upon the membrana tympani. This usually arises from cold, heat, or moisture, or the three combined, detaching it from the side of the auditory canal and causing it to press on the membrane. The second cause is an elongation of the hairs in the external orifice of the auditory canal, passing across and interlacing with cerumen or epithelium scales, and producing a sound like an Æolian harp. In another form, a single hair was found to rest upon the surface of the membrana tympani. A particle of pus on the same membrane gave not only a sound, but a disagreeable one, until removed.

"A third cause is a small quantity of adhesive mucus on the inner surface of the membrana tympani, or middle ear, pharyngeal orifice of the Eustachian tube, or on the mucous membrane near the tube. These conditions are almost always an attendant in acute, subacute, or chronic catarrh.

"A fourth cause is a foreign body in the Eustachian tube, as, for instance, a beard of barley,* or a bullet.† In the first case, the beard caused otitis media purulenta, with most distressing noises, and was ultimately discharged through a perforation of the membrana tympani without the loss of the hearing, and with entire relief to the tinnitus. The bullet could not be removed. In a case related by Fleischmann the result was not so satisfactory.

bull, M.D., Physician to the Department of the Eye and Ear, Howard Hospital, Philadelphia. Philadelphia: J. B. Lippincott and Co.

* Turnbull "On Diseases of the Ear," p. 78.

† Ibid., p. 94.

"A man had complained for years of a continuous sounding in his ears and of a very peculiar sensation in his pharynx. He died, and on a post-mortem section a beard of barley was found projecting from the pharyngeal orifice of the tube, and reaching into its osseous portion.*

"A fifth cause of tinnitus occurs synchronously with the action of the heart, and may be *anæmia* or a diseased condition of the blood, or enlargement or narrowing of some of the numerous arteries or their branches in the vicinity of the ear. This narrowing occurs generally in a branch of the temporal, posterior auricular, or carotid arteries, and we can determine by pressure whether it depends upon them, after finding no physical cause in the ear itself.

"A sixth class comprises a large number of doubtful cases, under the head of *nervous tinnitus*, in which it is conjectured that there is inflammation, irritation, extravasation, or disturbed circulation of blood in the labyrinth, cochlea, semicircular canal, auditory nerve, or reflected lesions of the brain.

"The diagnosis in this class of cases is made by excluding all causes which would be at all possible to produce the sound in the external or middle ear.

"The seventh cause is immoderate contraction of the tensor tympani muscle, which contraction not only moves the malleus and with it the membrana tympani, but also, if the contraction is excessive, the whole chain of ossicles is drawn inwards, and, as a consequence, the plate of the stirrup is pressed deeply into the oval window (fenestra ovalis), causing violent subjective noises from the intra-labyrinthal pres-

* Turnbull "On Diseases of the Ear," p. 79.

sure. 'Dr. Grüber* observes that the tensor tympani muscle arises from the cartilaginous portion of the Eustachian tube, but is connected with the tensor veli palati muscle by a tendinous prolongation in such a way that the intimate connection between the two is completed; and L. Mayer even asserts that he considers the two muscles as a single digastric muscle. It is well known how often this muscle suffers in the frequent diseases of the naso-pharyngeal structures. If we notice the soft palate and usually hypertrophied tonsils into which this muscle enters, we will see how the same is displaced and drawn out of its position, and it will be clear that this muscle in such cases is unable to properly perform its function, viz., the opening of the Eustachian tube; and this abnormity, sooner or later, will be sure to affect its companiom muscle—the tensor tympani—and so cause the spasmodic contraction of the latter, which will exert a further influence upon the labyrinth.'

"Now the question arises, Are there any positive symptoms by which we can with certainty diagnosticate in the living such a retraction of the tensor tympani muscle? We must answer most decidedly in the affirmative.

"I will not speak of the anamnesia, and of the subjective symptoms, which certainly deserve some consideration, but pass at once to those positive signs especially apparent in such cases. In consequence of the peculiar connection between the malleus and the membrana tympani, that is, the lower end of the malleus with the adjacent portion

* "Tenotomy of the Tensor Tympani," by Professor Joseph Grüber, M.D., Translated by Charles S. Turnbull, M.D., Phila., 1873, p. 23.

of the membrana, it is directed inwards, while at the upper end the short process pushes it outwards; and there originate two folds, the posterior of which is much more distinct, running backward, while the anterior fold runs forward, and in the comparison of this bulging with the sunken condition of the membrane we have an important indication, which Dr. Grüber was the first to describe and employ in diagnosis.

"When the membrana tympani is drawn forcibly inwards, the lower end of the malleus is drawn with it, while the upper end remains nearer its normal position, so causing the posterior fold of the membrana tympani to become more prominent, and we have at one an abnormal inward bulging of the membrana tympani. Of course, such a condition of the membrana tympani can be produced by causes other than a contraction of the tensor tympani, but we possess very positive means of investigation for distinguishing other abnormities which show the same pathognomonic appearances on the part of the membrana, and by exclusion we can make our diagnosis sure.

"Since I have here considered the greater prominence of the folds of the membrane as a diagnostic symptom of the sunken condition, and as a phenomenon related to shortening of the tendon of the tensor tympani, I might also describe many others which are all caused by shortening of the tendon.

"We know how to recognize and appreciate them, and, by a minute examination and some diagnostic acuteness, should seldom remain in doubt.

"In this connection I might mention a few of the

symptoms which are here of great diagnostic value, but which, as it seems to me, have not been sufficiently appreciated by my colleagues.

"These appearances are as follows: The handle of the malleus appears broader, the membrana tympani is twisted (torquirt sein), the axis-band of the malleus becomes more conspicuous, and the membrana tympani returns more or less rapidly, by retraction, into its former abnormal position, after the application of the air-douche had caused it to bulge outward."

"The eighth cause is 'Aspergillus in the auditory canal or on the membrana tympani;' this is a mould or fungus which causes inflammation with a discharge like otorrhœa, or a whitish membrane like cerumen or cholesterin. In every obstinate case of inflammation of the auditory canal we should carefully examine the discharged material under the microscope to be certain of the diagnosis. The symptoms are fulness of the ear, constant tinnitus aurium, and pain of a dull heavy character."*

Treatment.

Dr. Turnbull recites his practice in dealing with the preceding causes of tinnitus. I will take advantage of the following paragraphs: —

"In the fifth form, or pulsating tinnitus, the result of some alteration in the blood-vessels, anæmia, or excessive action of the heart, we must try compres-

* See paper by the writer on "Aspergillus," in "Transactions Med. Soc. of the State of Pennsylvania, 1873." "Diseases of the Ear," pp. 104–7.

sion of the temporal or carotid, diminishing the frequency of the heart's action by aconite or digitalis: or, if the patient is anæmic, administer the salts of manganese, or the lactate or citrate of iron, with good nourishing diet and out-door exercise, avoiding all forms of excitement, as dancing, violent exercise, or mental effort.

"In the sixth class we must make a careful diagnosis, by exclusion, to discover whether we have excitement of the brain causing subjective noises, or, on the other hand, the exhaustion from over-effort of the brain, or some drain upon the nervous system; for in the first instance we resort to large doses of bromide of potassium, or, if there is any suspicion of syphilitic complication, add the iodide of potassium until we produce bromidism on the one hand or iodidism on the other, with its characteristic eruption.

"If it is the second instance from exhaustion, we resort to a solution of phosphoric acid employed in the form of a lemonade, or to the phosphites or hypo-phosphites, in conjunction with strychnia or its salts, with the use of the galvanic current to complete the cure."

In the category of "causes" supplied by Dr. Turnbull, I would add another, viz., which I should propose to term "paralysis of the intrinsic muscles of the ear."

The treatment I have found most useful in these cases, is the application of faradisation directly to the tympanic membrane. I have had under my care many patients suffering from this form of tinnitus, whom I have relieved in this manner, after all other

measures adopted had failed to afford the slightest benefit.

Dr. Althaus, in his "Medical Electricity," says:— "All forms of electricity are able to rouse the vital energy of the auditory nerve, which responds to the stimulus by sounds. I have always found the sound produced to be as near as possible to the note A.

"Dr. Brenner, of St. Petersburgh, has made a most extensive series of researches on the action of electricity on the auditory nerve. According to him, the induced current is almost useless for experiments of this kind, because the rapidity with which the shocks succeed each other produces very unpleasant effects on the nerves of common sensation, without acting on the nerve of special sense. A specific response of the auditory nerve may nevertheless be obtained, but only by single closing or opening shocks from the induction apparatus, the opening shocks being the more effective ones. Some people perceive, when the power of the current is increased, a regular scale of auditive sensations, proceeding from humming to hissing, rolling, whistling, ringing, &c., and some hear sounds with low power, but tones with high power.

"Brenner's publications have given rise to an animated discussion, which was commenced by Dr. Schwartze, who pronounced Brenner's statements to be altogether erroneous, and utterly devoid of value in a diagnostic, prognostic, and therapeutical point of view. He was answered by Dr. Hagen, of Leipzig, who confirmed Brenner's statements in almost every particular; and by Brenner himself, who contended that Schwartze's

experiments of control had been made without any regard to the mode of experimentation recommended by himself, and were therefore worthless.

"A single shock from an induction apparatus produces a noise like a scratch; if the currents succeed each other rapidly, the noises do so likewise, and then resemble the buzzing of a fly on the window, or the blowing of a distant trumpet. At the same time a sensation of pricking and pain is perceived, if the current be of high tension. The negative pole is more effective in the production of the acoustic phenomena than the positive."

Dr. Brenner, of course, is speaking of the benefit derived from galvanism in nerve deafness. I am not going to discuss this subject, but I agree with him in thinking that the continuous current is more likely to be of permanent service to the patient in this disease than the use of the induction apparatus. But with reference to electricity as a remedy for severe noises in the ear, I maintain that the good effect I have obtained is due to the stimulation of the intrinsic muscles of the ear, but I shall go more fully into this presently. And this stimulation, it seems to me, is carried on better with faradisation than with galvanism. I have made a number of experiments with the continuous current without any good results. I use Dr. Stöhrer's double-celled induction apparatus, and pass the current directly on to the membrana tympani by means of a vulcanite speculum, with a piece of platinum wire passed through it, and which is attached to one of the wires of the battery. A silver probe brought into contact with the platinum is then used to carry on the

current from the speculum to the tympanic membrane. This instrument is made by Messrs. Krohne and Seseman, of Duke Street. At first it is neeessary to apply a very weak eurrent, whieh may be gradually inereased in strength. Of eourse there will be pain experieneed, but it is very slight if the shoek is eonveyed in the manner I have just mentioned. I have never, in a single ease, had any hæmorrhage, aeute pain, or any serious result from the applieation in this way.

"The production of the peculiar sensation of taste, whieh is caused by faradisation of the drum of the ear, is due to stimulation of the trunk of the chorda tympani, which, after having emerged from the cavity of the tympanum through the fissura Glaserii, descends towards the gustatory nerve, in the sheath of whieh it enters, and then proeeeds towards the tongue. Faradisation of the membrana tympani likewise produees eontraetions of the museles of the tympanum." *

I attribute the benefit derived in this form of tinnitus aurium entirely to stimulation of these museles, just as in other parts of the body paralysis is often overeome by the same means.

The first ease that I shall introduee is that of M. M., aged 38, who eame to eonsult me at the hospital, and who had been suffering from very severe noises in the ears for two years. It was almost unbearable at times. Both membranes looked unhealthy, dusky in colour, and concave; there was also obstruetion of both Eustachian tubes. The Politzer bag was of no

* For further information I would refer the reader to Dr. Althaus' pages.

use, and the catheter did not relieve the noise in her ears, although it improved her hearing.

Had two distinct sounds, which she described, one like a steam-engine blowing, and the other a singing noise like a kettle boiling. Heard my watch ten inches from the right ear, one yard from the left. Tuning-fork was heard best on the right side.

I then used Dr. Stöhrer's double-celled apparatus, and after a short time she said, "the engine noise does not seem so thick, and now it is more like a hissing." I went on with the faradisation until the blowing noise stopped altogether, her hearing also improved very much; the other singing sound continued.

On my next hospital day she came again and said she was much better. I repeated the faradisation, her hearing improved to one yard on the right side, two yards on the left.

The next day (February 24) she came to my house; I then applied the current to the membrana tympani by means of a probe passed through a speculum made for the purpose. Here the effect was much more marked; for a few seconds the second sound (that is the singing noise) entirely stopped, in whichever ear I applied the battery. A noise afterwards returned, but quite a different sound to what she had ever had before, and she exclaimed, "My head seems quite clear, and the noise is like a faint hurdy-gurdy, delightful compared to the other." She complained of a peculiar taste in her mouth, and said that the sensation in her ear was like pricking and scratching the drum of her ear with a pin. Her hearing improved two yards on the left side, and one and a half on the right.

Next day the hurdy-gurdy sound still remained, but she said that after she had seen me yesterday, the noise went away two or three times altogether, and it seemed quite strange to be without it. Formerly she could not sleep at night for the noise, but now got perfect rest. I kept the following notes of her progress :—

"February 26. Noise fainter, goes away at times; head much clearer.

"February 27. Still better; says that the hurdy-gurdy now sounds a long way off, and is getting fainter every day.

"February 28. I used the battery only to the membrane of the worst side, the right.

"March 1. Says that since yesterday the hurdy-gurdy sound has gone altogether from the right ear, but on the other side in which I did not apply the current, she still hears the same sound very faintly. She also said, 'When I got up in the morning, I had to listen some time before I could make out the noise. It is a very long way off, and does not trouble me in the least.'

"March 5. Hurdy-gurdy noise gone, but has very slight blowing noise again in right ear, which went away after faradisation.

"March 15. Gradually improving, but occasionally hears a slight noise, but always a very long way off. Since then the noises have come back again, but they can always be relieved in the same way."

I may here mention that in a great many patients who have consulted me for singing in the ears, I have failed to observe any abnormal condition of the membrana tympani, and yet the noises were as loud and

distressing as in the others, and they yielded readily to faradisation.

The next ease is that of A. F., aged 24, who had been deaf 14 years, with constant noise in her ears, which she said was like a steamer on the water, was very horrid, and so bad that she dreaded to go to bed. Heard wateh 2 inehes right side, 3 inches left; tuning-fork best in left. Here there was on both sides great concavity of membranes, with partial elosure of Eustaehian tubes, and fluid in tympanum. Faradisation was of great serviee; I applied it daily for a week. The "steamer" stopped, and never went on again. I saw her two months afterwards, and she had never had any return of the noise.

Mr. M., aged 28, who had suffered from chronie aural eatarrh for eight years, with deafness and severe tinnitus aurium, brought on from swimming under water; had unnatural coneavity of both membranes, and when he first consulted me both Eustachian tubes were impervious. I eonstantly passed the Eustaehian eatheter; this treatment had a very benefieial effect on his hearing, but the noise remained.

He spoke of a sound "like a railway whistle heard coming into a station from a tunnel;" and of another sound like blowing in a bottle, both constantly going on.

After faradisation the "whistle" remained, but the blowing almost ceased.

The noises got less every time I used the battery. In fact the treatment was so successful that he bought a battery for himself, and I saw no more of him.

My next case is that of a lady who had been deaf for 20 years, with a noise (which had never ceased), like the roaring of the sea. There was nothing remarkable to observe about her case. I saw her once a week, she was steadily improving, thanks to faradisation; the noise was much less, and left her altogether at times. She fancied her hearing was better, but I could not see much improvement myself in that respect. She, however, assured me that she was no longer troubled by *tinnitus aurium*.

The next patient, E. O., had been deaf 14 years, with constant severe tinnitus aurium like singing of a kettle and ringing of bells; both membranes of a dark grey colour; Eustachian tubes in healthy condition; heard watch 5 inches left, 4 right; tuning-fork best on right side. I treated this patient for a considerable time; but, although her hearing improved, the noise remained the same. I then applied the battery to the membrana tympani on both sides, and, after a short time, the sounds on both sides stopped for two or three minutes, and, when they returned, she said they were far off.

I used the battery five times; both noises had entirely ceased, and she had no return of them.

Mr. C. came to consult me, March 18th, with deafness and severe tinnitus aurium. Said that at times the noise in his ears was most distressing, but varied, sometimes like one noise, sometimes like another, but the steam-engine sound gave him most trouble. Had been suffering from chronic aural catarrh for five years, with all the usual symptoms; with great concavity of both tympanic membranes. I saw this gentleman six times, March 18th, 20th,

25th, 31st, and April 5th and 10th. The noise had steadily decreased and become fainter every day. His hearing distance, when he came to me, was 1 inch right ear, contact left; and, when I last saw him on the 10th of this month, it was 20 inches right, 18 inches left. He is still going on with the treatment.

In the next cases various noises are described. In H. B. the sound is like a "noise heard in a stone-yard;" E. W., "hammering on something hollow, like an iron foundry;" M. C., like "meeting a lot of trains on the underground railway;" R. B., noise like "being in a forest, the wind blowing very hard through the trees;" J. L., "a hissing;" E. P., like the "swarming of bees;" S. B., like "knocking of basins together;" J. B., like "a fly buzzing in the ear." All these have greatly benefited from the same treatment, and many of them are, I believe, cured.

Faradisation, no doubt, stimulates the intrinsic muscles of the ear, and therefore enables them to perform their function. I have reason to believe that the stapes often remains fixed within the foramen ovale in certain cases of tinnitus.

Such a condition doubtless does, from the continued pressure of the stapes on the internal ear, induce a constant formation of false sounds. The partial withdrawal of the stapes, effected by contraction of the stapedius muscle, would be followed by a reduction or temporary removal of such false sound; and I would, therefore, suggest that, if this stimulation be carried on perseveringly, the muscle may regain its tone and exert its proper influence in the auditory function.

Since the above was written, I have a great number of cases of tinnitus aurium which I attribute to this paralysis. I have no hesitation in saying, therefore, that if the noises in the ears be due to paralysis of these small muscles, relief may almost immediately be obtained by closely pressing the sponges of the battery into the auditory passages, and that still more satisfactory results are effected by using the probe in the way I have already mentioned. I am bound to admit, however, that such results are not always lasting. I have had lately several patients suffering from very severe noises and to whom most satisfactory relief was given, but in a short time the tinnitus returned, to be again relieved by faradisation. One patient especially, who has suffered dreadfully from an unusually violent singing in her head, obtains ease in this way for four or five days, after which it returns as severely as ever, but can again be immediately stopped by the use of the battery.

In conclusion—whether the sound arise from cerumen, debility, chlorosis, aural catarrh, or other cause—if the treatment be thoughtfully adapted to the peculiar circumstances of the case, a cure may, as a rule, be hoped for. In aural catarrh, especially, judicious treatment by the Politzer bag, the Eustachian catheter and other appliances I have suggested, will, in the majority of instances, be found successful.

INDEX.

HARRISON AND SONS, PRINTERS IN ORDINARY TO HER MAJESTY, ST. MARTIN'S LANE.